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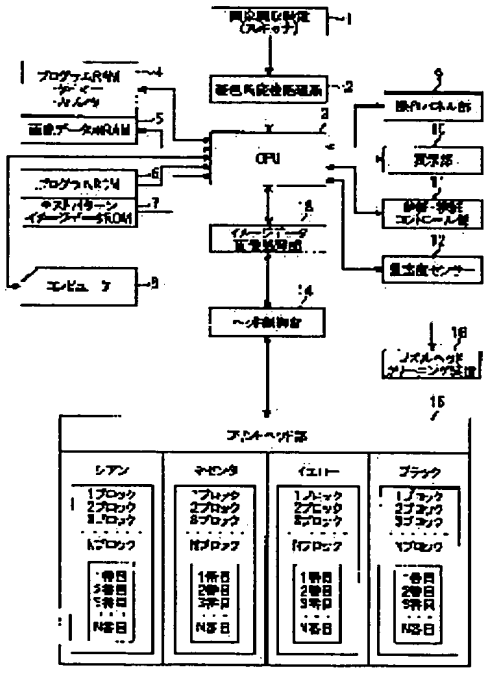
(54) INK JET PRINTER WITH IMAGE-READING DEVICE AND METHOD FOR PROCESSING ITS PRINT NOZZLE

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an apparatus and a method whereby printing in a normal nozzle state without clogging is made possible and, stable and high image-quality print samples can be obtained at all times by correctly detecting a failure generation point and displaying a warning to a user when a print nozzle clogs, and automatically performing maintenance to the nozzle clogging in some cases.



SOLUTION: A test pattern is printed to check whether or not an ink nozzle of the ink jet printer correctly functions. Image data of the printed sample is read by an image-reading device 1. An image data image-processing part 13 detects a failure of the ink nozzle from the read result. When it is judged that there is a failing nozzle, a message is displayed to a user or a cleaning operation is automatically conducted. In the case where the test printing is not turned good even

after the cleaning operation, a message for replacing ink heads is output.

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* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The image reader which reads a manuscript image by the reflected light of the light which irradiated the manuscript laid in the manuscript base, and is processed to image data, In the ink jet printer with an image reader which has the ink jet printer which breathes out ink from a print nozzle based on image data, and prints an image to a record medium Test printing of the 1st storage region which memorizes the test image data for test printing, and said test image data is carried out with said ink jet printer. The 2nd storage region which matches with the print nozzle of this ink jet printer, or a nozzle group the test printing image data which read this test printing image with said image reader, and memorizes it, The ink jet printer with an image reader characterized by establishing a detection means to detect a defect print nozzle or a nozzle group, based on the test printing image data memorized in said 2nd storage region.
[Claim 2] The ink jet printer with an image reader according to claim 1 characterized by having a cleaning means to clean the defect print nozzle or nozzle group detected with said detection means.
[Claim 3] The image reader which reads a manuscript image by the reflected light of the light which irradiated the manuscript laid in the manuscript base, and is processed to image data, It is the print nozzle art of an ink jet printer with an image reader which has the ink jet printer which breathes out ink from a print nozzle based on image data, and prints an image to a record medium. The test printing process which prints a test pattern to a record medium with said ink jet printer, The test pattern reading process of processing the test pattern printed at said test printing process to read in and image data with said image reader, The storage process which matches the image data of a test pattern reading process with the print nozzle of said ink jet printer, or a

nozzle group, and memorizes it for a storage means, The print nozzle art of the ink jet printer with an image reader characterized by having the defect detection process of carrying out threshold processing of the image data memorized by the storage means, and detecting a defect print nozzle or a nozzle group.

[Claim 4] The print nozzle art of the ink jet printer with an image reader according to claim 3 which carries out the description of performing a test printing process automatically based on a predetermined regulation.

[Claim 5] The print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by performing said test printing process and/or a test pattern reading process two or more times before said defect detection process.

[Claim 6] Said defect detection process is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by changing a threshold according to the class of test pattern to print.

[Claim 7] Said test printing process is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by using it for printing or carrying out only to the print nozzle or nozzle group used for printing.

[Claim 8] The print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by having the cleaning process which cleans the defect print nozzle or nozzle group detected at said detection process.

[Claim 9] The print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by warning a user of exchange of a print nozzle or a nozzle group when said test printing process is performed and a blinding print nozzle or a nozzle group is again after said cleaning process.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates the print nozzle function in an ink jet printer with an image reader to detection and a maintenance.
[0002]
[Description of the Prior Art] In order to check the print nozzle of an ink jet print conventionally, the test pattern was printed, and it judged whether the poor nozzle would have generated the printing sample by viewing of a user.
[0003] Moreover, the approach of reading a test pattern and detecting a non-injection nozzle by the photo sensor installed on ink jet printer carriage which is indicated by JP,10-258503,A, is learned.
[0004]
[Problem(s) to be Solved by the Invention] However, when a printing sample was judged visually, the difference by each user's subjectivity arose, and although nozzle blinding had occurred, there was a case where it was judged accidentally that it is good.
[0005] Moreover, when based on a means which is indicated by JP,10-258503,A, in order to detect vaguely whether nozzle blinding has occurred (ON/OFF), when detected with (ON) which blinding has generated, all nozzles are cleaned, since cleaning was performed [that is,] for cleaning also about the unnecessary part, ink was exhausted vainly, and it had become a problem for being uneconomical. Moreover, the photo sensor which does not usually use, but is used only when a user senses the blinding of a print nozzle needed to be prepared anew, and it became very inefficient equipment, and was a striped thing.
[0006] [when this invention is made in order to cancel the aforementioned trouble, and the blinding of a print nozzle has occurred]

A defect generating part is detected correctly, warning is displayed on a user, and nozzle blinding is automatically maintained depending on the case. By this Printing is made possible in the nozzle condition without blinding, and it aims at offering the equipment with which the always stabilized high definition print sample is obtained, and the art of the nozzle.

[0007] Moreover, also the case of the ink head in which a gradation expression is possible, and in the case of the ink head which uses ink with low saturation, it aims also at enabling the check of a poor print nozzle to printing of 1dot. .

[0008] Moreover, it aims also at making it actuation completed by necessary minimum amount of ink and time amount in cleaning actuation.

[0009] Moreover, when the nozzle which cannot be cleaned is poor, it aims also at offering the message of ink head exchange to a user.

[0010]

[Means for Solving the Problem] This invention has the next configuration in order to attain the above-mentioned purpose. The image reader which invention of claim 1 reads a manuscript image by the reflected light of the light which irradiated the manuscript laid in the manuscript base, and is processed to image data, In the ink jet printer with an image reader which has the ink jet printer which breathes out ink from a print nozzle based on image data, and prints an image to a record medium Test printing of the 1st storage region which memorizes the test image data for test printing, and said test image data is carried out with said ink jet printer. The 2nd storage region which matches with the print nozzle of this ink jet printer, or a nozzle group the test printing image data which read this test printing image with said image reader, and memorizes it, It is the ink jet printer with an image reader characterized by establishing a detection means to detect a defect print nozzle or a nozzle group, based on the test printing image data memorized in said 2nd storage region.

[0011] Invention of claim 2 is an ink jet printer with an image reader according to claim 1 characterized by having a cleaning means to clean the defect print nozzle or nozzle group detected with said detection means.

[0012] The image reader which invention of claim 3 reads a manuscript image by the reflected light of the light which irradiated the manuscript laid in the manuscript base, and is processed to image data, It is the print nozzle art of an ink jet printer with an image reader which has the

ink jet printer which breathes out ink from a print nozzle based on image data, and prints an image to a record medium. The test printing process which prints a test pattern to a record medium with said ink jet printer, The test pattern reading process of processing the test pattern printed at said test printing process to read in and image data with said image reader, The storage process which matches the image data of a test pattern reading process with the print nozzle of said ink jet printer, or a nozzle group, and memorizes it for a storage means, It is the print nozzle art of the ink jet printer with an image reader characterized by having the defect detection process of carrying out threshold processing of the image data memorized by the storage means, and detecting a defect print nozzle or a nozzle group.

[0013] It is the print nozzle art of the ink jet printer with an image reader according to claim 3 which carries out the description of invention of claim 4 performing a test printing process automatically based on a predetermined regulation.

[0014] It is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by invention of claim 5 performing said test printing process and/or a test pattern reading process two or more times before said defect detection process.

[0015] It is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by invention of claim 6 changing a threshold according to the class of test pattern to print, as for said defect detection process.

[0016] Invention of claim 7 is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by using said test printing process for printing, or performing it only to the print nozzle or nozzle group used for printing.

[0017] Invention of claim 8 is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by having the cleaning process which cleans the defect print nozzle or nozzle group detected at said detection process.

[0018] Invention of claim 9 is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by warning a user of exchange of a print nozzle or a nozzle group, when said test printing process is performed and a defect print nozzle or a nozzle group is again after said cleaning process.

[0019] According to invention of claim 1, based on the test image data for test printing memorized in the 1st storage region, test printing of the test image data is carried out with an ink jet printer. And it reads with

the image reader which put the test printing image side by side to the ink jet printer, and the test printing image data which it is as a result of [the] reading is matched with the print nozzle of an ink jet printer or nozzle group used for the test printing, and is memorized to the 2nd storage region. Therefore, a detection means can detect a defect print nozzle or nozzle groups, such as blinding, from the relation between the test printing image data memorized in the 2nd storage region, a corresponding print nozzle, or a nozzle group. Therefore, since the image reader which was put side by side to the ink jet printer and which is usually used for facsimile or a copy is used effectively, the defect of a print nozzle or a nozzle group is detected and a maintenance is possible based on it, it can do with an ink jet printer with an image reader always printable in the good condition.

[0020] According to invention of claim 2, blinding can be avoided by cleaning by having a cleaning means to clean the defect print nozzle or nozzle group detected with the detection means in addition to the operation effectiveness of invention of claim 1, case [whose defect of a print nozzle or a nozzle group is / like blinding].

[0021] According to invention of claim 3, a test pattern is printed by the storage with an ink jet printer at a test printing process, and the printed test pattern is processed by image data through a test pattern reading process, and the image data is matched with the print nozzle of an ink jet printer, or a nozzle group, it memorizes for a storage means, and a defect print nozzle or a nozzle group is detected by carrying out threshold processing of the memorized image data at a defect detection process. Therefore, since the image reader used for the facsimile which it already has, or a copy is used, the defect of a print nozzle or a nozzle group is detectable with an easy means.

[0022] According to invention of claim 4, in order to perform a test printing process automatically based on a predetermined regulation in addition to the operation effectiveness of invention of claim 3, defects, such as blinding of a print nozzle, can be detected appropriately and it becomes maintainable with a suitable stage in connection with it. Therefore, printing is always possible in the good condition.

[0023] According to invention of claim 5, in addition to the operation effectiveness of invention of claim 3, exact test printing and test pattern reading become possible, and incorrect detection at a defect detection process can be reduced by improvement in the detection precision in a defect detection process by performing a test printing process and a test pattern reading process two or more times before a defect

detection process.
[0024] Since the threshold in a defect detection process is changed [according to invention of claim 6] according to the class of test pattern to print in addition to the operation effectiveness of invention of claim 3, a light color etc. can be correctly detected by, for example, changing a threshold to a test pattern with gradation nature, and incorrect detection at a defect detection process can be reduced.
[0025] Since a test printing process is performed [according to invention of claim 7] to printing only to the print nozzle or nozzle group used for a use schedule or printing in addition to the operation effectiveness of invention of claim 3, it can cut down spending the amount of ink used at a test printing process, and the processing time beyond the need. Therefore, effective print nozzle processing is attained.
[0026] According to invention of claim 8, by having established the cleaning process which cleans the defect print nozzle or nozzle group detected at the detection process in addition to the operation effectiveness of invention of claim 3, a defect print nozzle is blinding, and a thing avoidable by performing washing etc. will be maintained automatically, and serves as a more user-friendly ink jet printer with an image reader which is easy to use.
[0027] When in addition to the operation effectiveness of invention of claim 3 said test printing process is performed and a defect print nozzle or a nozzle group is still again after a cleaning process according to invention of claim 9, since it warns a user of exchange of a print nozzle or a nozzle group, a user becomes exchangeable [a print nozzle] by suitable timing. Therefore, a user can always do printing in the good condition while being able to use it, without being conscious of exchange of a print nozzle etc.
[0028]
[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail with reference to a drawing. The block diagram of the whole system of the ink jet printer A with scanner equipment of this invention for image reading is shown in drawing 1 . The image reader with which one in drawing 1 is used for a scanner, a copy, etc., and 2 A color-coordinate-system transform-processing system, In 3, CPU and 4 RAM for image data, and 6 for Program RAM and 5 Program ROM 7 a computer and 9 for a test pattern image data and 8 The **** panel section, 10 -- for a sensor and 13, as for a head control section and 15, the image-data image-processing section and 14 are [a

display and 11 / feeding / delivery control section and 12 / the print head section and 16] nozzle cleaning equipment whenever [greenhouse].

[0029] It is equipment which copies with the scanner which is the image reader 1, or scans the manuscript image of one line to capture at a time by CCD (Charge Coupled Device), changes into a digital signal according to image concentration, and carries out and outputs the shading processing which are sensibility dispersion for every pixel of an R(red)/G (Green)/B (blue) image data, and amendment of lighting unevenness.

[0030] The color-coordinate-system transform-processing system 2 performs processing for changing into the image data of C (cyanogen)/M (Magenta)/Y(yellow)/K (black) the R/G/B image data sent from a scanner 1, and sending to CPU3.

[0031] It connects with a program RAM 4, RAM5 for image data, a program ROM 6, the test pattern image data ROM 7, the **** panel 9, a display 10, the control section 11 of feeding and conveyance, the temperature-and-humidity sensor 12, and the image-processing section 13, and CPU3 operates according to the program stored in the program ROM 6.

[0032] RAM 4 and 5 is used as a storage region of the working-level month of CPU3, and is used also for the information and the image data storage in various systems. The image data for performing program for each ROM 6 and 7 operating the program of operation and each system module of CPU3 and test pattern printing etc. has memorized the contents which must be held even if a power source is intercepted.

[0033] The control-panel section 9 is a control unit which sends the information for the various inputs from a user to ****** and CPU3, and a display 10 is a display which displays and carries out the message of the condition of various systems to a user. Feeding / delivery control section 11 controls feeding and conveyance of print media to the information from CPU3.

[0034] The image-data image-processing section 13 accumulates the image data sent from the image reader 1 (scanner) temporarily, and the image data is an alphabetic character image, a photograph, or the processor that, and performs filtering to the image or performs halftone processing etc., and it also has comparison processing of a nozzle test pattern for the temperature-and-humidity sensors 12 to be various sensors which act as the monitor of the operating environment of each part of ink jet printer with scanner equipment A, and performed. [a processor] [distinguish]

[0035] To be able to process the image data sent from the image-data image-processing section 13 in the print head section 15, it controls or the head control section 14 controls carriage 34 (refer to drawing 4). The print head section 15 is regurgitation equipment which prints the ink of each color to print media using the information from said head processing section 14. Nozzle cleaning equipment 16 cleans a defect nozzle, when the poor nozzle for printing which was prepared in the print head section 15 and which carries out the regurgitation of the ink occurs.

[0036] Drawing 2 is the outline perspective view of the whole ink jet printer with scanner equipment A, and the outline configuration is carried out from the scanner section 1 which is an image reader, and the printer section 18 to print. The scanner section 1 has the manuscript covering 20 with which it is made for the exposure light from the lamp 28 which pressed down and mentions later the manuscript base 19 and it which place a manuscript, and the reflected light not to leak, and explains it with reference to drawing 3 about the outline configuration in the scanner section 1.

[0037] Drawing 3 is the outline sectional view showing the optical system inside [17] a scanner in operation. If a manuscript 26 is set on the platen glass 25 which is transparent and colorless sheet glass and an image read order is made, the source lamp 28 of the illumination light arranged so that it may be located under the platen glass 25 and light may be irradiated towards platen glass 25 will light up, and the light by which this exposure light was ******(ed) and compared with the manuscript 26 will reflect the light of a certain wavelength according to the color drawn on the manuscript 26. Incidence of the light of this reflected wavelength is carried out to CCD33 through mirrors 29, 30, and 31 and the through lens 32. The light by which incidence was carried out to CCD33 is changed into an electrical signal according to the quantity of light. In reading of a color picture, at this time, it is changed into an electrical signal for every wavelength region of RGB. In addition, the standard white sheet 27 is a white sheet used in order to perform shading processing which performs amendment of sensibility dispersion for every pixel, and lighting unevenness before performing reading of a manuscript 26.

[0038] Moreover, the printer section 18 shown in drawing 2 is equipped with the body of a printer, and the control panel 9 for a user to direct to the feed section 21 which carries out the set receipt of the print media, such as paper and an OHP form, the delivery unit 22 which discharges

said print media which printing ended, and the whole equipment A and a display 10. The detail inside the body of a printer is explained with reference to drawing 4 .

[0039] Drawing 4 shows the internal outline configuration of the printer section 18 for printing with the perspective view in operation. The ink head 40 as the ink jet printer A itself indicated to be to drawing 5 , and the carriage 34 with which the ink tank 41 put the cartridge of ****** each color on one, The carriage shaft 35 for carriage 34 scanning and keeping a gap with print media P constant, Rota 36A which aligns with rotation of the carriage motor 36 for making the carriage 34 scan and the carriage motor 36, and rotates, and carriage ** RUTO 37 passed by anchoring at the ends through follower roller 36B, The outline configuration is carried out by the head cleaning section 39 which cleans the ink nozzle 42 of the ink head 40 prepared near the edge of the conveyance roller 38 which guides print media P, and the carriage shaft 35.

[0040] While carriage 34 makes penetration engagement of the sliding of the carriage shaft 35 free in the lower part, the carriage belt 37 is being fixed to the top side. Therefore, if the carriage motor 36 rotates, the rotation is transmitted to the carriage belt 37, and while it aligns with it and carriage 34 is supported by the carriage shaft 35 and the carriage belt 37, it will reciprocate. And since the conveyance roller 38 which the location where carriage 34 reciprocates meets caudad, and guides print media P has been formed, while print media P will pass through between the conveyance roller 38 and carriage 34 and controls rotation of the conveyance roller 38 and the carriage motor 36 in accordance with a printing instruction, it becomes print media P printable [a manuscript image] by carrying out the regurgitation of the ink to the 40th page of an ink head from the ink nozzle 42 formed in the shape of an array. In addition, in order to perform more exact printing, the carriage motor 36 grade is driven with the servo motor in which position control is possible.

[0041] The outline of the printing process of the ink jet printer A in the above-mentioned configuration is explained. First, when Form P is laid in the feed section 21 connected with the printer section 18, a manuscript 26 is placed on the printing demand based on the image information from a computer etc., or platen glass 25 and the copy carbon button on the control-panel section 9 is pushed by the user, Form P is conveyed from the feed section 21, and the printer section 18 is reached.

[0042] The printer section 18 scans the ink carriage 34 supported by

the ink carriage shaft 35, and image information is printed on Form P by carrying out the regurgitation of the ink from the required ink head 40 in connection with it corresponding to image information. At this time, a form stops and conveyance of the form P with which the ink carriage 34 is equivalent to two or more parts for the ink nozzle which the ink head 40 has when the scan of one line (one direction) is completed is made. Thus, the image information in ink is written in on Form P by the above-mentioned processing continuing and carrying it out in the printer section 18, corresponding to image information. The recorded form P is discharged by the tray which is a delivery unit 22, and a user is provided with it as a printing object.

[0043] the detailed hole which drawing 6 shows the perspective view of the ink head 40 of an ink jet printer A, was usually equipped with each head of black ink (K), cyanogen ink (C), Magenta ink (M), and yellow ink (Y), and ZURA and arranged the phase shift on each head -- the ink nozzle [be / it] 42 is given. In this operation gestalt, the cyanogen head CH which makes 1 block what shifted the nozzle location of three pieces which constitutes each line, carries out n block juxtaposition formation and makes n line three trains a unit, the Magenta head MH, and the yellow head YH are arranged to parallel in this sequence. Moreover, it adjoined in the direction of a train of said three heads CH, MH, and YH, and the black head KH of the same configuration as what doubled these three heads CH, MH, and YH is formed. In addition, with this operation gestalt, although n line three trains explained the array of a head, it is not limited to this. Moreover, one diameter of a nozzle of each of said ink nozzle 42 consists of dozens of micrometers, and is made with the micro-machining technique.

[0044] The enlarged drawing of said ink head 40 is shown in drawing 7 . This ink nozzle 42 is a part which affects image quality most on image formation, and when blinding, such as ink to an ink nozzle 42 and dust, etc. occurs, it will cause image quality degradation instantly. It roughly divides into the regurgitation approach of the ink from this ink nozzle 42 now, and those with two kind and its regurgitation principle are shown in drawing 8 . As the 1, there is a piezo method which makes the ink of the ink room 44 breathe out according to deformation of the piezo-electric element 43 of drawing 8 (a), and the BAPURU jet method or thermal method which makes the ink in the ink room (nozzle) 46 breathe out with the air bubbles which generate a ceramic heater 45 with heat in preparation for the inside of the nozzle of drawing 8 (b) as 2.

[0045] Moreover, there is a technique of ink as an important element of

an ink jet printer. Ink influenced hard dependability and has contributed it to the printing quality which is the last output greatly. Ink consists of many chemicals, such as an additive for adjusting the color which is a coloring agent, the wetting agent which prevents **** of the solid content deposit in ink, or ink, PH, and ink physical properties, and a penetrating agent.

[0046] Next, the test printing mode whether the ink nozzle 42 of the ink jet printer A with scanner equipment which gave [above-mentioned] explanation is functioning correctly, and for diagnosing is explained, referring to drawing 1 and the flow chart of 9. The image data of the test pattern with which it is remembered to ROM7 that CPU3 goes into test printing mode is loaded, and it transmits to the image-processing section 13 (S1, S2). The image data by which the image data of the test pattern with which the image-processing section 13 which received data was transmitted has been sent to delivery and the head control section 14 to the head control section 14 is sent to the print head section 15, and the test pattern is printed by Form P (S3). (test pattern printing sample)

[0047] An example of the above-mentioned test pattern printing sample is shown in drawing 10 . One dot of test patterns of this operation gestalt is hammered out at a time on discharge space in all nozzles to ink in order from the nozzle of the 1st each of the head CH for cyanogen, the head MH for Magentas, the head YH for yellow, and the head KH for blacks, and as shown in drawing 10 , as for each color sample, pattern printing is carried out to a slash condition. It detects the ink nozzle 42 of what position is carrying out blinding by reading the test pattern broken-line part of the shape of this straight line.

[0048] Next, the above-mentioned test pattern printout sample is read with the scanner which is the image reader 1 (S4). The resolution of reading of this scanner is the same as the resolution of an ink nozzle 42, or to be more than it is desired. It is because printed 1dot can read at least one half, but it may be unable to **** in a scanner side as 1 pixel or 2dot may carry out an incorrect judging to detection of the blinding of the nozzle of reading as 1 pixel, when it reads with the scanner of resolution lower than an ink nozzle 42.

[0049] Next, the image data of the test printing pattern read with the scanner 1 is changed into the data of cyanogen, a Magenta, yellow, and black by the color-coordinate-system conversion system 2, and is inputted into the image-data image-processing section 13 through CPU3. Here, as a result of having compared the recognition result and

threshold for every pixel, judging that a poor nozzle is nothing when it is as a result of [than a threshold / larger] recognition, and carrying out threshold processing similarly about all pixels, when there is no poor nozzle, nozzle test printing mode is ended (S5, 6, 7, 8 and 10). However, when at least 1 pixel of pixels smaller than a threshold is in a comparison result, it detects with a poor nozzle, and CPU3 displays nozzle cleaning directions on a display 10 (S9, 10).

[0050] Drawing 11 is what looked through the conditions which shift to the test printing mode which gave [above-mentioned] explanation with the block diagram, and shows an example of a control panel 9 and a display 10 to drawing 12 . When the power source 72 of Equipment A turns on (S20), it sets up so that it may go into the test printing mode (S33) of an ink nozzle 42 by the program beforehand memorized to ROM6. Although nozzle blinding may occur while being left by Equipment A by this over a long period of time, always stabilized high definition printing is enabled at the time of use. Moreover, when the power source 72 of Equipment A is turned off conversely (S21), you may set up so that it may go into the test printing mode (S33) of an ink nozzle 42 by the program beforehand memorized to ROM6. Even if it is left by this by the next use over a long period of time, generating of nozzle blinding is prevented beforehand and always stabilized high definition printing is attained.

[0051] Moreover, when it acts as the monitor of the neglect time amount and it is left by the timer which it had in CPU3 of Equipment A and which is not illustrated beyond fixed time amount (S22), it is set up so that it may go into the test printing mode (S33) of a nozzle 42 by the program feared the account of **. Although it is not used what a user looks at Equipment A and is using it frequently, and over a long period of time, distinction is very difficult, but when the relation between a neglect period and nozzle blinding generating is known experientially, even if it is the case where it is left by memorizing the period beforehand over a long period of time, high definition printing which measures were taken to nozzle blinding and was always stabilized is attained.

[0052] Moreover, when the value more than [through the print number-of-sheets counter which it had in CPU3 of Equipment A and which is not illustrated] fixed is reached (S23), it is set up so that it may go into nozzle test printing mode (S33). By the increment in the count of printing, since the probability of getting ink ** and dust blocked in a nozzle is high, always stabilized high definition printing is attained under supervising with a print number-of-sheets counter. Since it was the

same, when the value more than [through the print time amount timer which it had in CPU3 of Equipment A and which is not illustrated] fixed is reached (S24), it is set up so that it may go into the test printing mode (S33) of a nozzle. High definition printing which measures were taken to the nozzle blinding by the increment in the count of printing by this, and was always stabilized is attained.

[0053] Moreover, since the probability of getting ink ** and dust blocked in a nozzle 42 at a nozzle is high when the printing value more than [through the dot printing counter which was formed in CPU3 and which is not illustrated] fixed is reached (S25), it is set up so that it may go into test printing mode (S33) automatically. Measures are taken to the nozzle blinding by the increment in the count of printing by this, and always stabilized high definition printing is attained. Moreover, when the printing time amount more than [which has minded similarly the dot printing timer which it had in CPU3, and which is not illustrated] fixed is reached (S26), it is set up so that it may go into the test printing mode (S33) of a nozzle, and high definition printing which measures were taken to the nozzle blinding by increase of the count of printing, and was always stabilized is attained.

[0054] Moreover, when the print directions instruction from the control unit 9 or computer 8 of Equipment A is issued (S27), before performing the print, it is set up so that it may go into the test printing mode (S33) of an ink nozzle 42. Measures are taken to nozzle blinding to the nozzle blinding by long-term neglect before printing actuation by this, and always stabilized high definition printing is attained.

[0055] Moreover, when the high-definition printing medium is chosen in form selection of a control unit 9 or the print directions instruction from a computer 8 (S28), before performing the print, it can set up so that it may go into the test printing mode (S33) of a nozzle. This reduces useless use of an expensive printing medium to the nozzle blinding by long-term neglect, and always stabilized high definition printing is attained.

[0056] Moreover, when the print termination instruction from the printer section 18 of Equipment A is issued (S29), it can set up so that it may go into the test printing mode (S33) of a nozzle 42. High definition printing which the cure against nozzle blinding by the paper powder by the time of printing etc. of was attained by this, and was always stabilized is possible.

[0057] moreover, the form which the print termination instruction was taken out from the printer section 18 of Equipment A, and was then

used -- a regular paper -- or when the printing medium below [its] equivalent is chosen (S30), after performing the print, it can set up so that it may go into the test printing mode (S33) of a nozzle. This prevents the futility and blinding of the expensive ink head 42 to the nozzle blinding by the paper powder by the time of printing etc., and always stabilized high definition printing is attained.

[0058] Moreover, through the temperature-and-humidity sensor 12 of Equipment A, when the environmental variation of monitor Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. is large (S31), change of the installation environment of Equipment A is set up so that it may go into test printing mode (S33). High definition printing which prevented the useless blinding of the expensive ink head 42 to the nozzle blinding by desiccation etc. by this, and was always stabilized is possible.

[0059] Moreover, when a user wants through the selection carbon button 74 in the test pattern printing mode which it had on the control unit 9 of Equipment A (S32), it sets up so that it may go into test printing mode (S33). By this, usual is a special time of a different user using it, image degradation by peach blinding is prevented, and always stabilized high definition printing is attained.

[0060] Moreover, cleaning of the ink head 42 can be chosen by pushing the cleaning mode carbon button 73 on a control unit 9.

[0061] Next, if test printing mode (S33) is set up under said explained nozzle test print condition (S20-S32), according to directions of the program memorized by the program ROM 6, the test pattern MEJI data which loaded the test pattern image data and were loaded to the printer 18 section will carry out printing activation of CPU3. 1 pixel of ink is breathed out at a time in order in monochrome from eye ink nozzle watch of the head CH for cyanogen, the head MH for Magentas, the head YH for yellow, and the head BH for blacks, and this test pattern turns into a test pattern.

[0062] Drawing 13 shows the experimental result for the count of printing of a test pattern using the predetermined ink nozzle 42 without a defect about the printing condition of the test pattern at the time of [instead of 1 time] carrying out multiple-times activation. In drawing 13 , it is the graph which made the axis of abscissa the printing number of sheets of a test pattern, and made the axis of ordinate the rate of a poor nozzle judging result correct answer. As this graph showed, in the case where they are the case where the count of printing activation of a test pattern (number of sheets) is 1 time, and multiple times, it turned out that the direction the rate of a correct answer printed correctly

carried out [the direction] multiple-times printing is good.
[0063] Next, from the test pattern printed according to the above-mentioned conditions, the detection means of the blinding part of an ink nozzle 42 is explained. With this operation gestalt, the pixel into which read in and the pixel which should be read essentially are not read in the test pattern printed by using the image reader (scanner) 1 effectively is detected, and a defect nozzle part is pinpointed.
[0064] A test pattern sample is specifically first set on the platen glass 25 which is transparent and colorless sheet glass, light is irradiated with a lamp 28 at a manuscript, and incidence of the reflected light of wavelength according to the color drawn on the manuscript is carried out to CCD33 through each mirrors 29, 30, and 31 and the through lens 32. The light which carried out incidence to CCD33 is changed into an electrical signal according to the quantity of light, and, in reading of a color picture, is changed into the electrical signal for every wavelength region of RGB at this time. Each image data of this R/G/B performs shading processing for the illuminant cloth property of the each dispersion of CCD and the source lamp of the illumination light which were put in order by main scanning direction 1 train to make it amend, and changes it into the signal of cyanogen / MAZENDA / yellow / black from the signal of R/G/B by processing of the next color-coordinate-system conversion. When the resolution at this time uses the scanner of 300dpi, the 1-pixel diameter of dot is about 80-85 micrometers, and it consists of 40-45 micrometers at the time of 600dpi. Here, when the resolution of the nozzle 42 which performed test pattern printing is the same as the resolution by the side of a scanner 1 at 300dpi, it does not have a problem, but when different, resolution transform processing must be performed so that it may become the same resolution.
[0065] Moreover, since dispersion produces the reading data of this input system somewhat including the error of a processor, selection of a count of reading of a check printing pattern is enabled, and the result of having conducted the reading precision experiment to the count of reading is shown in drawing 14 . At drawing 14 , it reads on an axis of abscissa, the rate of a nozzle blinding condition decision result correct answer is shown on the count and the axis of ordinate, and it turned out that the direction which read the rate of a correct answer which judged the blinding condition of a nozzle correctly two or more times is good by the case where they are the case where the count of reading of a printing pattern is 1 time, and multiple times. Therefore, in order to read and to raise precision with this operation gestalt, reading processing of

multiple times is performed.
[0066] Next, it explains, referring to drawing 1 , the flow chart of 15, and drawing 16 about the detection approach of nozzle blinding. As for the ink head 40 used with this operation gestalt, the number of nozzles is [cyanogen, a Magenta, and the yellow of the resolution of a nozzle] 300dpi using the thing of 99 nozzles, respectively.
[0067] If there is an instruction in nozzle printing mode based on the conditions first described above (S40) A test pattern is printed (41 S 42), the sample is read by the image reader (scanner) 1 (S43), and the image data outputted from the image reader (scanner) 1 is set in the image-processing system 2. Color-coordinate-system transform processing is performed (S44), and resolution conversion is carried out so that it may become the resolution same next as a printing nozzle (S45). Since the scanner 1 also used the thing of 300dpi this time, resolution conversion was unnecessary.
[0068] Next, it matches with a nozzle, and inputs into the image-data box (memory) IB as shown in drawing 16 (a) for which the input value of the image datas from the 1st to the Nth was prepared by the image-processing section 13 through a detection means (S46) to detect the dot start location of the 1st nozzle which is not illustrated in order (S47), and a certain fixed threshold and fixed comparative judgment are performed for that inputted each image data (48 S 49). The image-data box IB is in the condition which shows in drawing 16 (a) according to an initial state, and is changed into each data of drawing 16 (b) by the input (S50) of the image data of a step (S47), and the existence data of blinding further shown in drawing 16 (c) through predetermined threshold processing of a step (S51) are created. And if it is detected that the defect has occurred based on the image-data box IB of drawing 16 (c) in the 2nd of a yellow nozzle, the 3rd, and the 9th 98th [the] of a Magenta nozzle, the warning message of a poor nozzle will be displayed on a display 10, and the correspondence of cleaning, exchange, etc. of a user will be attained based on the warning (53 S 54).
[0069] by drawing 16 , although the measurement result about the case of binary printing data was shown, the detection approach of the nozzle blinding come out and using the nozzle in which the multiple-value gradation printing is possible which the thing which can print a light color also has with the gradation nature of a multiple value is explained to the class of ink head. In starting, as shown in drawing 17 and ** (a) of 18, 19, and 20 as a test printing pattern, it prepares the image-data box IB which inputs memory data gradually beforehand to compensate for

change of gradation nature. And drawing 17 and the data shown in ** (b) of 18, 19, and 20 are obtained, and the result of having printed and read the test printing pattern carries out threshold processing of said data with the threshold according to each phase further, obtains the ** (c) result of drawing 17 , and 18, 19 and 20, and makes a nozzle blinding condition judgment. In addition, the threshold according to each phase in this operation gestalt was set to 214, 150, 96, and 32 to drawing 17 , and 18, 19 and 20 at sequence. By this processing, decision of the blinding condition of a nozzle becomes possible appropriately also at a light test printing sample with gradation nature.

[0070] Moreover, also according to the class of ink to be used, since it is possible, it attaches in that case and printing with gradation nature is explained. The case where ink and photograph ink with the gradation nature instead of usual ink are used is explained with reference to drawing 21 . As shown in drawing 21 (a) before an image-data input, the test pattern which has carried out memory was the same as the case where said ordinary ink is used, but although the result of having read the test printing sample was max as printing gradation expression capacity of a nozzle as an image data, it turned out that the almost same value as the time (drawing 19) of the printing gradation expression capacity when using ordinary ink as shown in drawing 21 (b) being one half is shown. Therefore, when saturation of ink is low, it becomes possible by changing a threshold according to the condition corresponding to the photograph ink, and carrying out a comparative judgment to detect a blinding condition correctly also about ink heads, such as photograph ink of a light color.

[0071] Although the case where always breathed out ink from all nozzles and a defect nozzle was detected was explained by the detection approach of the blinding of said explained nozzle 42, in order to detect blinding more efficiently and effectively, how to detect by fewer nozzles is explained. If a laser beam printer is the nozzle, for example, monochrome printing, used for printing as the 1st means, blinding will be beforehand detected for the nozzle head 40 which will use the head KH for black for next printing like the head CH for cyanogen, the head MH for Magentas, and the head YH for yellow if it is color printing again. A detail is explained referring to the flow chart of drawing 22 .

[0072] first, if a print instruction is sent from CPU3, the ink head (all nozzles, black, and a color -- a photograph color nozzle) then used will choose -- having (S61-S64) -- the class (2 gradation, multiple-value gradation) of printing gradation nature is chosen (S65-S67). And

according to the class of the selected ink head 40 and printing gradation nature, the nozzle check of a nozzle 42 which performs blinding detection is performed (S68-S87). Thus, reduction of ink required for test pattern printing, the processing times, etc. can be performed by detecting blinding beforehand only to the ink head 40 and ink nozzle 42 which are used behind, and it enables a maintenance to carry out about nozzle blinding efficiently.

[0073] Efficient processing is attained even if the 2nd means carries out blinding detection to said the 1st means and reverse ex post only to the nozzle used for printing. In this case, the flag field which shows the use hysteresis of a nozzle to which memory is prepared, the flag corresponding to the nozzle head 40 used by the last printing is searched, and a blinding check is performed only about the used head 40 corresponding to that searched flag, or a nozzle 42. For example, when the last printing is printing of only black ink, blinding detection will be performed only to the head KH for black. Therefore, also in this case, the settled processing time can also be shortened by ink consumption of the need minimum.

[0074] As for the nozzle 42 with which clogging was detected by the blinding detection means which gave [above-mentioned] explanation, cleaning of a clogging part is performed by the nozzle head-cleaning device 16 (KURININNGU mode). In addition, the shift to KURININNGU mode can be performed by being two kinds with the case where it is based on the case where it is based on a user instruction, and automatic setting. When are based on a user instruction, and a clogging nozzle is detected, based on the test printing output of nozzle blinding, on a display 10 (refer to drawing 12), it warns a user by the display of a nozzle cleaning instruction, and enters at nozzle cleaning actuation of the ink head 40 through the cleaning mode carbon button 73 on the control-panel section 9 by activation hope of a user of cleaning actuation. On the other hand, in shifting to KURININNGU mode in automatic setting, if a clogging nozzle is detected, it will clean the ink head 40 in the head cleaning section 39 of the nozzle head-cleaning device 16, without waiting for an instruction of a user.

[0075] Cleaning actuation of the ink head section 40 is shown in drawing 23 . Usually, although the carriage 34 after a printing halt is outside from the form width of face W1 in the home position P1 on the overrun (run-up section) field W2, or the location of P2, when nozzle cleaning actuation is chosen, it is made to **** carriage 34 in the head cleaning section 39 of the nozzle head-cleaning device 16, and cleans the ink

head 40. After cleaning termination returns to the usual home position 1 or 2 again.

[0076] Moreover, cleaning actuation of the above-mentioned ink head 40 is explained, referring to the flow chart shown in drawing 24 about a means to clean more effectively, although the ink head 40 whole surface is cleaned. Since it is exactly detectable per a nozzle block or nozzle from the image-data box IB which a blinding nozzle indicates above-mentioned gave explanation to ** (c) of 21 from a service condition or drawing 16 (S90-98), efficient cleaning actuation is realizable by cleaning only a corresponding ink head (S99-101).

[0077] Next, the schematic diagram of the head cleaning section 39 is explained with reference to drawing 4 and 25. For example, since the ink heads 40 to be cleaned are a Magenta and yellow when the result of a nozzle check is the image-data box IB of drawing 16 (c), the cleaner putt 100 which washes a nozzle operates only the part corresponding to a Magenta and yellow, and cleans a nozzle 42. Thereby, the amount of ink beyond the need and business time amount of cleaning actuation are made few at cleaning actuation. In addition, when based on a user instruction, the message of cleaning termination is performed to a display 10 with termination of cleaning.

[0078] In the case of drawing 25 , the unit of the ink nozzle 42 to clean was shown per each color ink head, but it carries out more desirably per the predetermined block which constitutes each color nozzle, for example, one line, (three nozzles). The schematic diagram of the head cleaning section 39 which cleans only an ink nozzle block to be cleaned [this] is shown in drawing 26 . For example, in cleaning based on the image-data box IB result of drawing 16 (c), the required ink heads 40 of cleaning are the 3rd block of a Magenta head, the 33rd block, and the 1st block of a yellow head, and then, the cleaner putt 101 operates only the 3rd of a Magenta head, the 33rd block, and the 1st block of a yellow head, and cleans a nozzle 42. By this cleaning actuation, the amount of ink beyond the need and business time amount of cleaning actuation are made few.

[0079] Furthermore, an ink nozzle 42 is desirably cleaned in each nozzle unit, and the schematic diagram of the head cleaning section 39 is shown in drawing 27 . For example, in as a result of drawing 16 (c), ink heads to be cleaned are the 9th of the Magenta head MH, the 98th, the 2nd of the yellow head YH, and the 3rd, and only the part corresponding to the 9th of the Magenta head of the cleaner putt 102, the 98th, the 2nd of a yellow head, and the 3rd operates, and they clean a nozzle 42.

By this cleaning actuation, the amount of ink beyond the need and business time amount of cleaning actuation can be lessened more.
[0080] By the above-mentioned explanation, when it was judged that there is a poor nozzle, the case where it warned a user of a message was explained to the display 10, but you may set up so that cleaning actuation may be started automatically, as described above. In starting cleaning actuation automatically, test pattern printing for the second time is performed after cleaning termination of a nozzle, a nozzle check is again performed from the printing data, and it becomes possible effectively to carry out by blinding still repeating cleaning of a blinding nozzle or a nozzle group automatically further in a certain case. And even if it repeats cleaning of a nozzle 42 two or more times and performs it, when blinding is not canceled, since suitable printing cannot be performed, the exchange message of the ink head 40 is displayed on a user, by warning of it being at the exchange stage of the ink head 40, it becomes exchangeable [the ink head 40] to suitable timing, and always good printing is secured. The flow chart of the process which warns drawing 28 of exchange of the above-mentioned ink head 40 is shown. In addition, it is the process as the so-called above mentioned test pattern printing process and the blinding test check process of a nozzle that test printing mode (S110) to the warning message display (S120) to a display is the same, and explanation is omitted.
[0081] First, the detection process of a poor reading nozzle is performed (S110-S117). In CPU3, the count N which the poor nozzle generated is counted at the same time it displays the warning message to a display 10 (119 S 120), when a nozzle fault is detected (S121). And if the count N of continuation which the poor nozzle generated is less than 3 times, it shifts to the cleaning mode (S122) of the ink head 40, and the ink head 40 will be cleaned and it will shift to test printing mode (S110) again after cleaning termination. On the other hand, when the count N of continuation which the poor nozzle generated becomes 3 times, it is judged as the unrestorable abnormalities by the bad debt of the ink in the heater section which is not illustrated etc., the message of exchange of the ink head 40 is displayed to a user (S124), and the nozzle diagnostic mode is ended (S123). In this case, the message which tells abnormalities (ink head exchange) is displayed on a display 10 through CPU3.
[0082] As mentioned above, when blinding is not canceled as a multiple-times line in nozzle cleaning, by warning a user of it being the exchange stage of the ink head 40, exchange of the ink head 40 is made to

suitable timing, and always good printing is secured. In addition, to perform from test printing mode (S110) to nozzle cleaning mode (S122) automatically, it is necessary to form the equipment which draws the test pattern printing sample sent to the delivery unit 22 on the manuscript base 19.

[0083]

[Effect of the Invention] It becomes possible by diagnosing the nozzle function of an ink jet printer with an image reader according to this invention, and maintaining a print nozzle, if a fault is detected to supply the quality image always stabilized as an image finally outputted on print media as explained above.

[0084] Since it becomes possible to perform an image judging mechanically by using effectively and reading the image reader (scanner) which put side by side the **** test pattern by this invention in order to already perform a scanner and a copy, it is not necessary to attach a reader anew for a diagnosis of a nozzle function. Moreover, printing decision of the test pattern by subjectivity is lost, an accurate result can be obtained and error decision is lost.

[0085] Moreover, since cleaning actuation is automatically started when there are time amount compaction for judging and a poor nozzle, since a poor nozzle is judged automatically, troublesome actuation is lost.

[0086] When the blinding of a printer nozzle has occurred, since a poor nozzle generating part is investigated from a decision result and a printer nozzle is cleaned in necessary minimum cleaning actuation, the amount of ink required for cleaning and the business time amount of cleaning actuation can be reduced.

[0087] Moreover, printing of a light color etc. can also detect a defect nozzle appropriately by detecting by changing a threshold according to the class of test pattern printed at a detection process.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates the print nozzle function in an ink jet printer with an image reader to detection and a maintenance.

[Translation done.]

* NOTICES *

PRIOR ART

[Description of the Prior Art] In order to check the print nozzle of an ink jet print conventionally, the test pattern was printed, and it judged whether the poor nozzle would have generated the printing sample by viewing of a user.
[0003] Moreover, the approach of reading a test pattern and detecting a non-injection nozzle by the photo sensor installed on ink jet printer carriage which is indicated by JP,10-258503,A, is learned.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] It becomes possible by diagnosing the nozzle function of an ink jet printer with an image reader according to this invention, and maintaining a print nozzle, if a fault is detected to supply the quality image always stabilized as an image finally outputted on print media as explained above.
[0084] Since it becomes possible to perform an image judging mechanically by using effectively and reading the image reader (scanner) which put side by side the **** test pattern by this invention in order to already perform a scanner and a copy, it is not necessary to attach a reader anew for a diagnosis of a nozzle function. Moreover, printing decision of the test pattern by subjectivity is lost, an accurate result can be obtained and error decision is lost.
[0085] Moreover, since cleaning actuation is automatically started when there are time amount compaction for judging and a poor nozzle, since a poor nozzle is judged automatically, troublesome actuation is lost.
[0086] When the blinding of a printer nozzle has occurred, since a poor nozzle generating part is investigated from a decision result and a printer nozzle is cleaned in necessary minimum cleaning actuation, the amount of ink required for cleaning and the business time amount of cleaning actuation can be reduced.
[0087] Moreover, printing of a light color etc. can also detect a defect nozzle appropriately by detecting by changing a threshold according to the class of test pattern printed at a detection process.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when a printing sample was judged visually, the difference by each user's subjectivity arose, and although nozzle blinding had occurred, there was a case where it was judged accidentally that it is good.
[0005] Moreover, when based on a means which is indicated by JP,10-258503,A, in order to detect vaguely whether nozzle blinding has occurred (ON/OFF), when detected with (ON) which blinding has generated, all nozzles are cleaned, since cleaning was performed [that is,] for cleaning also about the unnecessary part, ink was exhausted vainly, and it had become a problem for being uneconomical. Moreover, the photo sensor which does not usually use, but is used only when a user senses the blinding of a print nozzle needed to be prepared anew, and it became very inefficient equipment, and was a striped thing.
[0006] This invention is made in order to cancel the aforementioned trouble. The purpose is offering the equipment with which the high definition print sample which detected the defect generating part correctly, displayed warning on the user when the blinding of a print nozzle had occurred, maintained nozzle blinding automatically depending on the case, made printing possible in the nozzle condition without blinding by this, and was always stabilized is obtained, and the art of the nozzle.
[0007] Moreover, also the case of the ink head in which a gradation expression is possible, and in the case of the ink head which uses ink with low saturation, it aims also at enabling the check of a poor print nozzle to printing of 1dot. .
[0008] Moreover, it aims also at making it actuation completed by necessary minimum amount of ink and time amount in cleaning actuation.

[0009] Moreover, when the nozzle which cannot be cleaned is poor, it aims also at offering the message of ink head exchange to a user.

[Translation done.]

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MEANS

[Means for Solving the Problem] This invention has the next configuration in order to attain the above-mentioned purpose. The image reader which invention of claim 1 reads a manuscript image by the reflected light of the light which irradiated the manuscript laid in the manuscript base, and is processed to image data, In the ink jet printer with an image reader which has the ink jet printer which breathes out ink from a print nozzle based on image data, and prints an image to a record medium Test printing of the 1st storage region which memorizes the test image data for test printing, and said test image data is carried out with said ink jet printer. The 2nd storage region which matches with the print nozzle of this ink jet printer, or a nozzle group the test printing image data which read this test printing image with said image reader, and memorizes it, It is the ink jet printer with an image reader characterized by establishing a detection means to detect a defect print nozzle or a nozzle group, based on the test printing image data memorized in said 2nd storage region.
[0011] Invention of claim 2 is an ink jet printer with an image reader according to claim 1 characterized by having a cleaning means to clean the defect print nozzle or nozzle group detected with said detection means.
[0012] The image reader which invention of claim 3 reads a manuscript image by the reflected light of the light which irradiated the manuscript laid in the manuscript base, and is processed to image data, It is the print nozzle art of an ink jet printer with an image reader which has the ink jet printer which breathes out ink from a print nozzle based on image data, and prints an image to a record medium. The test printing process which prints a test pattern to a record medium with said ink jet printer, The test pattern reading process of processing the test pattern printed

at said test printing process to read in and image data with said image reader, The storage process which matches the image data of a test pattern reading process with the print nozzle of said ink jet printer, or a nozzle group, and memorizes it for a storage means, It is the print nozzle art of the ink jet printer with an image reader characterized by having the defect detection process of carrying out threshold processing of the image data memorized by the storage means, and detecting a defect print nozzle or a nozzle group.

[0013] It is the print nozzle art of the ink jet printer with an image reader according to claim 3 which carries out the description of invention of claim 4 performing a test printing process automatically based on a predetermined regulation.

[0014] It is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by invention of claim 5 performing said test printing process and/or a test pattern reading process two or more times before said defect detection process.

[0015] It is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by invention of claim 6 changing a threshold according to the class of test pattern to print, as for said defect detection process.

[0016] Invention of claim 7 is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by using said test printing process for printing, or performing it only to the print nozzle or nozzle group used for printing.

[0017] Invention of claim 8 is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by having the cleaning process which cleans the defect print nozzle or nozzle group detected at said detection process.

[0018] Invention of claim 9 is the print nozzle art of the ink jet printer with an image reader according to claim 3 characterized by warning a user of exchange of a print nozzle or a nozzle group, when said test printing process is performed and a defect print nozzle or a nozzle group is again after said cleaning process.

[0019] According to invention of claim 1, based on the test image data for test printing memorized in the 1st storage region, test printing of the test image data is carried out with an ink jet printer. And it reads with the image reader which put the test printing image side by side to the ink jet printer, and the test printing image data which it is as a result of [the] reading is matched with the print nozzle of an ink jet printer or nozzle group used for the test printing, and is memorized to the 2nd

storage region. Therefore, a detection means can detect a defect print nozzle or nozzle groups, such as blinding, from the relation between the test printing image data memorized in the 2nd storage region, a corresponding print nozzle, or a nozzle group. Therefore, since the image reader which was put side by side to the ink jet printer and which is usually used for facsimile or a copy is used effectively, the defect of a print nozzle or a nozzle group is detected and a maintenance is possible based on it, it can do with an ink jet printer with an image reader always printable in the good condition.

[0020] According to invention of claim 2, blinding can be avoided by cleaning by having a cleaning means to clean the defect print nozzle or nozzle group detected with the detection means in addition to the operation effectiveness of invention of claim 1, case [whose defect of a print nozzle or a nozzle group is / like blinding].

[0021] According to invention of claim 3, a test pattern is printed by the storage with an ink jet printer at a test printing process, and the printed test pattern is processed by image data through a test pattern reading process, and the image data is matched with the print nozzle of an ink jet printer, or a nozzle group, it memorizes for a storage means, and a defect print nozzle or a nozzle group is detected by carrying out threshold processing of the memorized image data at a defect detection process. Therefore, since the image reader used for the facsimile which it already has, or a copy is used, the defect of a print nozzle or a nozzle group is detectable with an easy means.

[0022] According to invention of claim 4, in order to perform a test printing process automatically based on a predetermined regulation in addition to the operation effectiveness of invention of claim 3, defects, such as blinding of a print nozzle, can be detected appropriately and it becomes maintainable with a suitable stage in connection with it. Therefore, printing is always possible in the good condition.

[0023] According to invention of claim 5, in addition to the operation effectiveness of invention of claim 3, exact test printing and test pattern reading become possible, and incorrect detection at a defect detection process can be reduced by improvement in the detection precision in a defect detection process by performing a test printing process and a test pattern reading process two or more times before a defect detection process.

[0024] Since the threshold in a defect detection process is changed [according to invention of claim 6] according to the class of test pattern to print in addition to the operation effectiveness of invention of

claim 3, a light color etc. can be correctly detected by, for example, changing a threshold to a test pattern with gradation nature, and incorrect detection at a defect detection process can be reduced.
[0025] Since a test printing process is performed [according to invention of claim 7] to printing only to the print nozzle or nozzle group used for a use schedule or printing in addition to the operation effectiveness of invention of claim 3, it can cut down spending the amount of ink used at a test printing process, and the processing time beyond the need. Therefore, effective print nozzle processing is attained.
[0026] According to invention of claim 8, by having established the cleaning process which cleans the defect print nozzle or nozzle group detected at the detection process in addition to the operation effectiveness of invention of claim 3, a defect print nozzle is blinding, and a thing avoidable by performing washing etc. will be maintained automatically, and serves as a more user-friendly ink jet printer with an image reader which is easy to use.
[0027] When in addition to the operation effectiveness of invention of claim 3 said test printing process is performed and a defect print nozzle or a nozzle group is still again after a cleaning process according to invention of claim 9, since it warns a user of exchange of a print nozzle or a nozzle group, a user becomes exchangeable [a print nozzle] by suitable timing. Therefore, a user can always do printing in the good condition while being able to use it, without being conscious of exchange of a print nozzle etc.
[0028]
[Embodiment of the Invention] Hereafter, the operation gestalt of this invention is explained to a detail with reference to a drawing. The block diagram of the whole system of the ink jet printer A with scanner equipment of this invention for image reading is shown in drawing 1 . The image reader with which one in drawing 1 is used for a scanner, a copy, etc., and 2 A color-coordinate-system transform-processing system, In 3, CPU and 4 RAM for image data, and 6 for Program RAM and 5 Program ROM 7 a computer and 9 for a test pattern image data and 8 The **** panel section, 10 -- for a sensor and 13, as for a head control section and 15, the image-data image-processing section and 14 are [a display and 11 / feeding / delivery control section and 12 / the print head section and 16] nozzle cleaning equipment whenever [greenhouse].
[0029] It is equipment which copies with the scanner which is the image

reader 1, or scans the manuscript image of one line to capture at a time by CCD (Charge Coupled Device), changes into a digital signal according to image concentration, and carries out and outputs the shading processing which are sensibility dispersion for every pixel of an R(red)/G (Green)/B (blue) image data, and amendment of lighting unevenness.
[0030] The color-coordinate-system transform-processing system 2 performs processing for changing into the image data of C (cyanogen)/M (Magenta)/Y(yellow)/K (black) the R/G/B image data sent from a scanner 1, and sending to CPU3.
[0031] It connects with a program RAM 4, RAM5 for image data, a program ROM 6, the test pattern image data ROM 7, the **** panel 9, a display 10, the control section 11 of feeding and conveyance, the temperature-and-humidity sensor 12, and the image-processing section 13, and CPU3 operates according to the program stored in the program ROM 6.
[0032] RAM 4 and 5 is used as a storage region of the working-level month of CPU3, and is used also for the information and the image data storage in various systems. The image data for performing program for each ROM 6 and 7 operating the program of operation and each system module of CPU3 and test pattern printing etc. has memorized the contents which must be held even if a power source is intercepted.
[0033] The control-panel section 9 is a control unit which sends the information for the various inputs from a user to ****** and CPU3, and a display 10 is a display which displays and carries out the message of the condition of various systems to a user. Feeding / delivery control section 11 controls feeding and conveyance of print media to the information from CPU3.
[0034] The image-data image-processing section 13 accumulates the image data sent from the image reader 1 (scanner) temporarily, and the image data is an alphabetic character image, a photograph, or the processor that, and performs filtering to the image or performs halftone processing etc., and it also has comparison processing of a nozzle test pattern for the temperature-and-humidity sensors 12 to be various sensors which act as the monitor of the operating environment of each part of ink jet printer with scanner equipment A, and performed. [a processor] [distinguish]
[0035] To be able to process the image data sent from the image-data image-processing section 13 in the print head section 15, it controls or the head control section 14 controls carriage 34 (refer to drawing 4). The print head section 15 is regurgitation equipment which prints the ink

of each color to print media using the information from said head processing section 14. Nozzle cleaning equipment 16 cleans a defect nozzle, when the poor nozzle for printing which was prepared in the print head section 15 and which carries out the regurgitation of the ink occurs.

[0036] Drawing 2 is the outline perspective view of the whole ink jet printer with scanner equipment A, and the outline configuration is carried out from the scanner section 1 which is an image reader, and the printer section 18 to print. The scanner section 1 has the manuscript covering 20 with which it is made for the exposure light from the lamp 28 which pressed down and mentions later the manuscript base 19 and it which place a manuscript, and the reflected light not to leak, and explains it with reference to drawing 3 about the outline configuration in the scanner section 1.

[0037] Drawing 3 is the outline sectional view showing the optical system inside [17] a scanner in operation. If a manuscript 26 is set on the platen glass 25 which is transparent and colorless sheet glass and an image read order is made, the source lamp 28 of the illumination light arranged so that it may be located under the platen glass 25 and light may be irradiated towards platen glass 25 will light up, and the light by which this exposure light was ******(ed) and compared with the manuscript 26 will reflect the light of a certain wavelength according to the color drawn on the manuscript 26. Incidence of the light of this reflected wavelength is carried out to CCD33 through mirrors 29, 30, and 31 and the through lens 32. The light by which incidence was carried out to CCD33 is changed into an electrical signal according to the quantity of light. In reading of a color picture, at this time, it is changed into an electrical signal for every wavelength region of RGB. In addition, the standard white sheet 27 is a white sheet used in order to perform shading processing which performs amendment of sensibility dispersion for every pixel, and lighting unevenness before performing reading of a manuscript 26.

[0038] Moreover, the printer section 18 shown in drawing 2 is equipped with the body of a printer, and the control panel 9 for a user to direct to the feed section 21 which carries out the set receipt of the print media, such as paper and an OHP form, the delivery unit 22 which discharges said print media which printing ended, and the whole equipment A and a display 10. The detail inside the body of a printer is explained with reference to drawing 4 .

[0039] Drawing 4 shows the internal outline configuration of the printer

section 18 for printing with the perspective view in operation. The ink head 40 as the ink jet printer A itself indicated to be to drawing 5 , and the carriage 34 with which the ink tank 41 put the cartridge of ****** each color on one, The carriage shaft 35 for carriage 34 scanning and keeping a gap with print media P constant, Rota 36A which aligns with rotation of the carriage motor 36 for making the carriage 34 scan and the carriage motor 36, and rotates, and carriage ** RUTO 37 passed by anchoring at the ends through follower roller 36B, The outline configuration is carried out by the head cleaning section 39 which cleans the ink nozzle 42 of the ink head 40 prepared near the edge of the conveyance roller 38 which guides print media P, and the carriage shaft 35.

[0040] While carriage 34 makes penetration engagement of the sliding of the carriage shaft 35 free in the lower part, the carriage belt 37 is being fixed to the top side. Therefore, if the carriage motor 36 rotates, the rotation is transmitted to the carriage belt 37, and while it aligns with it and carriage 34 is supported by the carriage shaft 35 and the carriage belt 37, it will reciprocate. And since the conveyance roller 38 which the location where carriage 34 reciprocates meets caudad, and guides print media P has been formed, while print media P will pass through between the conveyance roller 38 and carriage 34 and controls rotation of the conveyance roller 38 and the carriage motor 36 in accordance with a printing instruction, it becomes print media P printable [a manuscript image] by carrying out the regurgitation of the ink to the 40th page of an ink head from the ink nozzle 42 formed in the shape of an array. In addition, in order to perform more exact printing, the carriage motor 36 grade is driven with the servo motor in which position control is possible.

[0041] The outline of the printing process of the ink jet printer A in the above-mentioned configuration is explained. First, when Form P is laid in the feed section 21 connected with the printer section 18, a manuscript 26 is placed on the printing demand based on the image information from a computer etc., or platen glass 25 and the copy carbon button on the control-panel section 9 is pushed by the user, Form P is conveyed from the feed section 21, and the printer section 18 is reached.

[0042] The printer section 18 scans the ink carriage 34 supported by the ink carriage shaft 35, and image information is printed on Form P by carrying out the regurgitation of the ink from the required ink head 40 in connection with it corresponding to image information. At this time, a form stops and conveyance of the form P with which the ink carriage 34

is equivalent to two or more parts for the ink nozzle which the ink head 40 has when the scan of one line (one direction) is completed is made. Thus, the image information in ink is written in on Form P by the above-mentioned processing continuing and carrying it out in the printer section 18, corresponding to image information. The recorded form P is discharged by the tray which is a delivery unit 22, and a user is provided with it as a printing object.

[0043] the detailed hole which drawing 6 shows the perspective view of the ink head 40 of an ink jet printer A, was usually equipped with each head of black ink (K), cyanogen ink (C), Magenta ink (M), and yellow ink (Y), and ZURA and arranged the phase shift on each head -- the ink nozzle [be / it] 42 is given. In this operation gestalt, the cyanogen head CH which makes 1 block what shifted the nozzle location of three pieces which constitutes each line, carries out n block juxtaposition formation and makes n line three trains a unit, the Magenta head MH, and the yellow head YH are arranged to parallel in this sequence. Moreover, it adjoined in the direction of a train of said three heads CH, MH, and YH, and the black head KH of the same configuration as what doubled these three heads CH, MH, and YH is formed. In addition, with this operation gestalt, although n line three trains explained the array of a head, it is not limited to this. Moreover, one diameter of a nozzle of each of said ink nozzle 42 consists of dozens of micrometers, and is made with the micro-machining technique.

[0044] The enlarged drawing of said ink head 40 is shown in drawing 7 . This ink nozzle 42 is a part which affects image quality most on image formation, and when blinding, such as ink to an ink nozzle 42 and dust, etc. occurs, it will cause image quality degradation instantly. It roughly divides into the regurgitation approach of the ink from this ink nozzle 42 now, and those with two kind and its regurgitation principle are shown in drawing 8 . As the 1, there is a piezo method which makes the ink of the ink room 44 breathe out according to deformation of the piezo-electric element 43 of drawing 8 (a), and the BAPURU jet method or thermal method which makes the ink in the ink room (nozzle) 46 breathe out with the air bubbles which generate a ceramic heater 45 with heat in preparation for the inside of the nozzle of drawing 8 (b) as 2.

[0045] Moreover, there is a technique of ink as an important element of an ink jet printer. Ink influenced hard dependability and has contributed it to the printing quality which is the last output greatly. Ink consists of many chemicals, such as an additive for adjusting the color which is a coloring agent, the wetting agent which prevents **** of the solid

content deposit in ink, or ink, PH, and ink physical properties, and a penetrating agent.

[0046] Next, the test printing mode whether the ink nozzle 42 of the ink jet printer A with scanner equipment which gave [above-mentioned] explanation is functioning correctly, and for diagnosing is explained, referring to drawing 1 and the flow chart of 9. The image data of the test pattern with which it is remembered to ROM7 that CPU3 goes into test printing mode is loaded, and it transmits to the image-processing section 13 (S1, S2). The image data by which the image data of the test pattern with which the image-processing section 13 which received data was transmitted has been sent to delivery and the head control section 14 to the head control section 14 is sent to the print head section 15, and the test pattern is printed by Form P (S3). (test pattern printing sample)

[0047] An example of the above-mentioned test pattern printing sample is shown in drawing 10 . One dot of test patterns of this operation gestalt is hammered out at a time on discharge space in all nozzles to ink in order from the nozzle of the 1st each of the head CH for cyanogen, the head MH for Magentas, the head YH for yellow, and the head KH for blacks, and as shown in drawing 10 , as for each color sample, pattern printing is carried out to a slash condition. It detects the ink nozzle 42 of what position is carrying out blinding by reading the test pattern broken-line part of the shape of this straight line.

[0048] Next, the above-mentioned test pattern printout sample is read with the scanner which is the image reader 1 (S4). The resolution of reading of this scanner is the same as the resolution of an ink nozzle 42, or to be more than it is desired. It is because printed 1dot can read at least one half, but it may be unable to **** in a scanner side as 1 pixel or 2dot may carry out an incorrect judging to detection of the blinding of the nozzle of reading as 1 pixel, when it reads with the scanner of resolution lower than an ink nozzle 42.

[0049] Next, the image data of the test printing pattern read with the scanner 1 is changed into the data of cyanogen, a Magenta, yellow, and black by the color-coordinate-system conversion system 2, and is inputted into the image-data image-processing section 13 through CPU3. Here, as a result of having compared the recognition result and threshold for every pixel, judging that a poor nozzle is nothing when it is as a result of [than a threshold / larger] recognition, and carrying out threshold processing similarly about all pixels, when there is no poor nozzle, nozzle test printing mode is ended (S5, 6, 7, 8 and 10). However,

when at least 1 pixel of pixels smaller than a threshold is in a comparison result, it detects with a poor nozzle, and CPU3 displays nozzle cleaning directions on a display 10 (S9, 10).
[0050] Drawing 11 is what looked through the conditions which shift to the test printing mode which gave [above-mentioned] explanation with the block diagram, and shows an example of a control panel 9 and a display 10 to drawing 12 . When the power source 72 of Equipment A turns on (S20), it sets up so that it may go into the test printing mode (S33) of an ink nozzle 42 by the program beforehand memorized to ROM6. Although nozzle blinding may occur while being left by Equipment A by this over a long period of time, always stabilized high definition printing is enabled at the time of use. Moreover, when the power source 72 of Equipment A is turned off conversely (S21), you may set up so that it may go into the test printing mode (S33) of an ink nozzle 42 by the program beforehand memorized to ROM6. Even if it is left by this by the next use over a long period of time, generating of nozzle blinding is prevented beforehand and always stabilized high definition printing is attained.
[0051] Moreover, when it acts as the monitor of the neglect time amount and it is left by the timer which it had in CPU3 of Equipment A and which is not illustrated beyond fixed time amount (S22), it is set up so that it may go into the test printing mode (S33) of a nozzle 42 by the program feared the account of **. Although it is not used what a user looks at Equipment A and is using it frequently, and over a long period of time, distinction is very difficult, but when the relation between a neglect period and nozzle blinding generating is known experientially, even if it is the case where it is left by memorizing the period beforehand over a long period of time, high definition printing which measures were taken to nozzle blinding and was always stabilized is attained.
[0052] Moreover, when the value more than [through the print number-of-sheets counter which it had in CPU3 of Equipment A and which is not illustrated] fixed is reached (S23), it is set up so that it may go into nozzle test printing mode (S33). By the increment in the count of printing, since the probability of getting ink ** and dust blocked in a nozzle is high, always stabilized high definition printing is attained under supervising with a print number-of-sheets counter. Since it was the same, when the value more than [through the print time amount timer which it had in CPU3 of Equipment A and which is not illustrated] fixed is reached (S24), it is set up so that it may go into the test printing mode (S33) of a nozzle. High definition printing which measures were

taken to the nozzle blinding by the increment in the count of printing by this, and was always stabilized is attained.
[0053] Moreover, since the probability of getting ink ** and dust blocked in a nozzle 42 at a nozzle is high when the printing value more than [through the dot printing counter which was formed in CPU3 and which is not illustrated] fixed is reached (S25), it is set up so that it may go into test printing mode (S33) automatically. Measures are taken to the nozzle blinding by the increment in the count of printing by this, and always stabilized high definition printing is attained. Moreover, when the printing time amount more than [which has minded similarly the dot printing timer which it had in CPU3, and which is not illustrated] fixed is reached (S26), it is set up so that it may go into the test printing mode (S33) of a nozzle, and high definition printing which measures were taken to the nozzle blinding by increase of the count of printing, and was always stabilized is attained.
[0054] Moreover, when the print directions instruction from the control unit 9 or computer 8 of Equipment A is issued (S27), before performing the print, it is set up so that it may go into the test printing mode (S33) of an ink nozzle 42. Measures are taken to nozzle blinding to the nozzle blinding by long-term neglect before printing actuation by this, and always stabilized high definition printing is attained.
[0055] Moreover, when the high-definition printing medium is chosen in form selection of a control unit 9 or the print directions instruction from a computer 8 (S28), before performing the print, it can set up so that it may go into the test printing mode (S33) of a nozzle. This reduces useless use of an expensive printing medium to the nozzle blinding by long-term neglect, and always stabilized high definition printing is attained.
[0056] Moreover, when the print termination instruction from the printer section 18 of Equipment A is issued (S29), it can set up so that it may go into the test printing mode (S33) of a nozzle 42. High definition printing which the cure against nozzle blinding by the paper powder by the time of printing etc. of was attained by this, and was always stabilized is possible.
[0057] moreover, the form which the print termination instruction was taken out from the printer section 18 of Equipment A, and was then used -- a regular paper -- or when the printing medium below [its] equivalent is chosen (S30), after performing the print, it can set up so that it may go into the test printing mode (S33) of a nozzle. This prevents the futility and blinding of the expensive ink head 42 to the

nozzle blinding by the paper powder by the time of printing etc., and always stabilized high definition printing is attained.
[0058] Moreover, through the temperature-and-humidity sensor 12 of Equipment A, when the environmental variation of monitor Perilla frutescens (L.) Britton var. crispa (Thunb.) Decne. is large (S31), change of the installation environment of Equipment A is set up so that it may go into test printing mode (S33). High definition printing which prevented the useless blinding of the expensive ink head 42 to the nozzle blinding by desiccation etc. by this, and was always stabilized is possible.
[0059] Moreover, when a user wants through the selection carbon button 74 in the test pattern printing mode which it had on the control unit 9 of Equipment A (S32), it sets up so that it may go into test printing mode (S33). By this, usual is a special time of a different user using it, image degradation by peach blinding is prevented, and always stabilized high definition printing is attained.
[0060] Moreover, cleaning of the ink head 42 can be chosen by pushing the cleaning mode carbon button 73 on a control unit 9.
[0061] Next, if test printing mode (S33) is set up under said explained nozzle test print condition (S20-S32), according to directions of the program memorized by the program ROM 6, the test pattern MEJI data which loaded the test pattern image data and were loaded to the printer 18 section will carry out printing activation of CPU3. 1 pixel of ink is breathed out at a time in order in monochrome from eye ink nozzle watch of the head CH for cyanogen, the head MH for Magentas, the head YH for yellow, and the head BH for blacks, and this test pattern turns into a test pattern.
[0062] Drawing 13 shows the experimental result for the count of printing of a test pattern using the predetermined ink nozzle 42 without a defect about the printing condition of the test pattern at the time of [instead of 1 time] carrying out multiple-times activation. In drawing 13 , it is the graph which made the axis of abscissa the printing number of sheets of a test pattern, and made the axis of ordinate the rate of a poor nozzle judging result correct answer. As this graph showed, in the case where they are the case where the count of printing activation of a test pattern (number of sheets) is 1 time, and multiple times, it turned out that the direction the rate of a correct answer printed correctly carried out [the direction] multiple-times printing is good.
[0063] Next, from the test pattern printed according to the above-mentioned conditions, the detection means of the blinding part of an ink nozzle 42 is explained. With this operation gestalt, the pixel into which

read in and the pixel which should be read essentially are not read in the test pattern printed by using the image reader (scanner) 1 effectively is detected, and a defect nozzle part is pinpointed.

[0064] A test pattern sample is specifically first set on the platen glass 25 which is transparent and colorless sheet glass, light is irradiated with a lamp 28 at a manuscript, and incidence of the reflected light of wavelength according to the color drawn on the manuscript is carried out to CCD33 through each mirrors 29, 30, and 31 and the through lens 32. The light which carried out incidence to CCD33 is changed into an electrical signal according to the quantity of light, and, in reading of a color picture, is changed into the electrical signal for every wavelength region of RGB at this time. Each image data of this R/G/B performs shading processing for the illuminant cloth property of the each dispersion of CCD and the source lamp of the illumination light which were put in order by main scanning direction 1 train to make it amend, and changes it into the signal of cyanogen / MAZENDA / yellow / black from the signal of R/G/B by processing of the next color-coordinate-system conversion. When the resolution at this time uses the scanner of 300dpi, the 1-pixel diameter of dot is about 80-85 micrometers, and it consists of 40-45 micrometers at the time of 600dpi. Here, when the resolution of the nozzle 42 which performed test pattern printing is the same as the resolution by the side of a scanner 1 at 300dpi, it does not have a problem, but when different, resolution transform processing must be performed so that it may become the same resolution.

[0065] Moreover, since dispersion produces the reading data of this input system somewhat including the error of a processor, selection of a count of reading of a check printing pattern is enabled, and the result of having conducted the reading precision experiment to the count of reading is shown in drawing 14 . At drawing 14 , it reads on an axis of abscissa, the rate of a nozzle blinding condition decision result correct answer is shown on the count and the axis of ordinate, and it turned out that the direction which read the rate of a correct answer which judged the blinding condition of a nozzle correctly two or more times is good by the case where they are the case where the count of reading of a printing pattern is 1 time, and multiple times. Therefore, in order to read and to raise precision with this operation gestalt, reading processing of multiple times is performed.

[0066] Next, it explains, referring to drawing 1 , the flow chart of 15, and drawing 16 about the detection approach of nozzle blinding. As for the ink head 40 used with this operation gestalt, the number of nozzles is

[cyanogen, a Magenta, and the yellow of the resolution of a nozzle] 300dpi using the thing of 99 nozzles, respectively.
[0067] If there is an instruction in nozzle printing mode based on the conditions first described above (S40) A test pattern is printed (41 S 42), the sample is read by the image reader (scanner) 1 (S43), and the image data outputted from the image reader (scanner) 1 is set in the image-processing system 2. Color-coordinate-system transform processing is performed (S44), and resolution conversion is carried out so that it may become the resolution same next as a printing nozzle (S45). Since the scanner 1 also used the thing of 300dpi this time, resolution conversion was unnecessary.
[0068] Next, it matches with a nozzle, and inputs into the image-data box (memory) IB as shown in drawing 16 (a) for which the input value of the image datas from the 1st to the Nth was prepared by the image-processing section 13 through a detection means (S46) to detect the dot start location of the 1st nozzle which is not illustrated in order (S47), and a certain fixed threshold and fixed comparative judgment are performed for that inputted each image data (48 S 49). The image-data box IB is in the condition which shows in drawing 16 (a) according to an initial state, and is changed into each data of drawing 16 (b) by the input (S50) of the image data of a step (S47), and the existence data of blinding further shown in drawing 16 (c) through predetermined threshold processing of a step (S51) are created. And if it is detected that the defect has occurred based on the image-data box IB of drawing 16 (c) in the 2nd of a yellow nozzle, the 3rd, and the 9th 98th [the] of a Magenta nozzle, the warning message of a poor nozzle will be displayed on a display 10, and the correspondence of cleaning, exchange, etc. of a user will be attained based on the warning (53 S 54).
[0069] by drawing 16 , although the measurement result about the case of binary printing data was shown, the detection approach of the nozzle blinding come out and using the nozzle in which the multiple-value gradation printing is possible which the thing which can print a light color also has with the gradation nature of a multiple value is explained to the class of ink head. In starting, as shown in drawing 17 and ** (a) of 18, 19, and 20 as a test printing pattern, it prepares the image-data box IB which inputs memory data gradually beforehand to compensate for change of gradation nature. And drawing 17 and the data shown in ** (b) of 18, 19, and 20 are obtained, and the result of having printed and read the test printing pattern carries out threshold processing of said data with the threshold according to each phase further, obtains the ** (c)

result of drawing 17 , and 18, 19 and 20, and makes a nozzle blinding condition judgment. In addition, the threshold according to each phase in this operation gestalt was set to 214, 150, 96, and 32 to drawing 17 , and 18, 19 and 20 at sequence. By this processing, decision of the blinding condition of a nozzle becomes possible appropriately also at a light test printing sample with gradation nature.

[0070] Moreover, also according to the class of ink to be used, since it is possible, it attaches in that case and printing with gradation nature is explained. The case where ink and photograph ink with the gradation nature instead of usual ink are used is explained with reference to drawing 21 . As shown in drawing 21 (a) before an image-data input, the test pattern which has carried out memory was the same as the case where said ordinary ink is used, but although the result of having read the test printing sample was max as printing gradation expression capacity of a nozzle as an image data, it turned out that the almost same value as the time (drawing 19) of the printing gradation expression capacity when using ordinary ink as shown in drawing 21 (b) being one half is shown. Therefore, when saturation of ink is low, it becomes possible by changing a threshold according to the condition corresponding to the photograph ink, and carrying out a comparative judgment to detect a blinding condition correctly also about ink heads, such as photograph ink of a light color.

[0071] Although the case where always breathed out ink from all nozzles and a defect nozzle was detected was explained by the detection approach of the blinding of said explained nozzle 42, in order to detect blinding more efficiently and effectively, how to detect by fewer nozzles is explained. If a laser beam printer is the nozzle, for example, monochrome printing, used for printing as the 1st means, blinding will be beforehand detected for the nozzle head 40 which will use the head KH for black for next printing like the head CH for cyanogen, the head MH for Magentas, and the head YH for yellow if it is color printing again. A detail is explained referring to the flow chart of drawing 22 .

[0072] first, if a print instruction is sent from CPU3, the ink head (all nozzles, black, and a color -- a photograph color nozzle) then used will choose -- having (S61-S64) -- the class (2 gradation, multiple-value gradation) of printing gradation nature is chosen (S65-S67). And according to the class of the selected ink head 40 and printing gradation nature, the nozzle check of a nozzle 42 which performs blinding detection is performed (S68-S87). Thus, reduction of ink required for test pattern printing, the processing times, etc. can be performed by

detecting blinding beforehand only to the ink head 40 and ink nozzle 42 which are used behind, and it enables a maintenance to carry out about nozzle blinding efficiently.

[0073] Efficient processing is attained even if the 2nd means carries out blinding detection to said the 1st means and reverse ex post only to the nozzle used for printing. In this case, the flag field which shows the use hysteresis of a nozzle to which memory is prepared, the flag corresponding to the nozzle head 40 used by the last printing is searched, and a blinding check is performed only about the used head 40 corresponding to that searched flag, or a nozzle 42. For example, when the last printing is printing of only black ink, blinding detection will be performed only to the head KH for black. Therefore, also in this case, the settled processing time can also be shortened by ink consumption of the need minimum.

[0074] As for the nozzle 42 with which clogging was detected by the blinding detection means which gave [above-mentioned] explanation, cleaning of a clogging part is performed by the nozzle head-cleaning device 16 (KURININNGU mode). In addition, the shift to KURININNGU mode can be performed by being two kinds with the case where it is based on the case where it is based on a user instruction, and automatic setting. When are based on a user instruction, and a clogging nozzle is detected, based on the test printing output of nozzle blinding, on a display 10 (refer to drawing 12), it warns a user by the display of a nozzle cleaning instruction, and enters at nozzle cleaning actuation of the ink head 40 through the cleaning mode carbon button 73 on the control-panel section 9 by activation hope of a user of cleaning actuation. On the other hand, in shifting to KURININNGU mode in automatic setting, if a clogging nozzle is detected, it will clean the ink head 40 in the head cleaning section 39 of the nozzle head-cleaning device 16, without waiting for an instruction of a user.

[0075] Cleaning actuation of the ink head section 40 is shown in drawing 23 . Usually, although the carriage 34 after a printing halt is outside from the form width of face W1 in the home position P1 on the overrun (run-up section) field W2, or the location of P2, when nozzle cleaning actuation is chosen, it is made to **** carriage 34 in the head cleaning section 39 of the nozzle head-cleaning device 16, and cleans the ink head 40. After cleaning termination returns to the usual home position 1 or 2 again.

[0076] Moreover, cleaning actuation of the above-mentioned ink head 40 is explained, referring to the flow chart shown in drawing 24 about a

means to clean more effectively, although the ink head 40 whole surface is cleaned. Since it is exactly detectable per a nozzle block or nozzle from the image-data box IB which a blinding nozzle indicates above-mentioned gave explanation to ** (c) of 21 from a service condition or drawing 16 (S90-98), efficient cleaning actuation is realizable by cleaning only a corresponding ink head (S99-101).

[0077] Next, the schematic diagram of the head cleaning section 39 is explained with reference to drawing 4 and 25. For example, since the ink heads 40 to be cleaned are a Magenta and yellow when the result of a nozzle check is the image-data box IB of drawing 16 (c), the cleaner putt 100 which washes a nozzle operates only the part corresponding to a Magenta and yellow, and cleans a nozzle 42. Thereby, the amount of ink beyond the need and business time amount of cleaning actuation are made few at cleaning actuation. In addition, when based on a user instruction, the message of cleaning termination is performed to a display 10 with termination of cleaning.

[0078] In the case of drawing 25 , the unit of the ink nozzle 42 to clean was shown per each color ink head, but it carries out more desirably per the predetermined block which constitutes each color nozzle, for example, one line, (three nozzles). The schematic diagram of the head cleaning section 39 which cleans only an ink nozzle block to be cleaned [this] is shown in drawing 26 . For example, in cleaning based on the image-data box IB result of drawing 16 (c), the required ink heads 40 of cleaning are the 3rd block of a Magenta head, the 33rd block, and the 1st block of a yellow head, and then, the cleaner putt 101 operates only the 3rd of a Magenta head, the 33rd block, and the 1st block of a yellow head, and cleans a nozzle 42. By this cleaning actuation, the amount of ink beyond the need and business time amount of cleaning actuation are made few.

[0079] Furthermore, an ink nozzle 42 is desirably cleaned in each nozzle unit, and the schematic diagram of the head cleaning section 39 is shown in drawing 27 . For example, in as a result of drawing 16 (c), ink heads to be cleaned are the 9th of the Magenta head MH, the 98th, the 2nd of the yellow head YH, and the 3rd, and only the part corresponding to the 9th of the Magenta head of the cleaner putt 102, the 98th, the 2nd of a yellow head, and the 3rd operates, and they clean a nozzle 42. By this cleaning actuation, the amount of ink beyond the need and business time amount of cleaning actuation can be lessened more.

[0080] By the above-mentioned explanation, when it was judged that there is a poor nozzle, the case where it warned a user of a message

was explained to the display 10, but you may set up so that cleaning actuation may be started automatically, as described above. In starting cleaning actuation automatically, test pattern printing for the second time is performed after cleaning termination of a nozzle, a nozzle check is again performed from the printing data, and it becomes possible effectively to carry out by blinding still repeating cleaning of a blinding nozzle or a nozzle group automatically further in a certain case. And even if it repeats cleaning of a nozzle 42 two or more times and performs it, when blinding is not canceled, since suitable printing cannot be performed, the exchange message of the ink head 40 is displayed on a user, by warning of it being at the exchange stage of the ink head 40, it becomes exchangeable [the ink head 40] to suitable timing, and always good printing is secured. The flow chart of the process which warns drawing 28 of exchange of the above-mentioned ink head 40 is shown. In addition, it is the process as the so-called above mentioned test pattern printing process and the blinding test check process of a nozzle that test printing mode (S110) to the warning message display (S120) to a display is the same, and explanation is omitted.

[0081] First, the detection process of a poor reading nozzle is performed (S110-S117). In CPU3, the count N which the poor nozzle generated is counted at the same time it displays the warning message to a display 10 (119 S 120), when a nozzle fault is detected (S121). And if the count N of continuation which the poor nozzle generated is less than 3 times, it shifts to the cleaning mode (S122) of the ink head 40, and the ink head 40 will be cleaned and it will shift to test printing mode (S110) again after cleaning termination. On the other hand, when the count N of continuation which the poor nozzle generated becomes 3 times, it is judged as the unrestorable abnormalities by the bad debt of the ink in the heater section which is not illustrated etc., the message of exchange of the ink head 40 is displayed to a user (S124), and the nozzle diagnostic mode is ended (S123). In this case, the message which tells abnormalities (ink head exchange) is displayed on a display 10 through CPU3.

[0082] As mentioned above, when blinding is not canceled as a multiple-times line in nozzle cleaning, by warning a user of it being the exchange stage of the ink head 40, exchange of the ink head 40 is made to suitable timing, and always good printing is secured. In addition, to perform from test printing mode (S110) to nozzle cleaning mode (S122) automatically, it is necessary to form the equipment which draws the test pattern printing sample sent to the delivery unit 22 on the

manuscript base 19.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram of the system of the ink jet printer A with reading image ****** concerning the operation gestalt of this invention.
[Drawing 2] It is the perspective view of the ink jet printer A with reading image ****** concerning the operation gestalt of this invention.
[Drawing 3] It is the operation-explanatory view of the optical system of image ****** 1.
[Drawing 4] It is the operation-explanatory view of the printer section 18 concerning the operation gestalt of this invention.
[Drawing 5] It is the perspective view of the print ink head 40 of the printer section 18 concerning the operation gestalt of this invention.
[Drawing 6] It is the bottom view of the print ink head 40 concerning the operation gestalt of this invention.
[Drawing 7] It is the enlarged drawing of the base of the print ink head 40 concerning the operation gestalt of this invention.
[Drawing 8] It is the operation-explanatory view of the ink regurgitation principle (an a:piezo method, b: Bubble Jet) of the head nozzle of an ink jet printer.
[Drawing 9] It is the flow chart in the test printing mode concerning the operation gestalt of this invention.
[Drawing 10] It is the explanatory view of a test printing pattern.
[Drawing 11] It is the block diagram showing the conditions for shifting to the test printing mode concerning the operation gestalt of this invention.
[Drawing 12] It is the schematic diagram of the control panel of the ink jet printer A with image ****** concerning the operation gestalt of this invention.

[Drawing 13] It is the graph using the ink jet printer A with image ****** concerning the operation gestalt of this invention which shows the rate of a poor nozzle judging result correct answer to test pattern printing number of sheets.
[Drawing 14] It is the graph using the ink jet printer A with image ****** concerning the operation gestalt of this invention which shows the rate of a poor nozzle decision result correct answer to the count of test printing pattern reading.
[Drawing 15] It is the flow chart of a poor nozzle detection process using the nozzle check pattern of the ink jet printer A with image ****** concerning the operation gestalt of this invention.
[Drawing 16] It is the contents explanatory view of image-data box IB in case the nozzle check pattern concerning the operation gestalt of this invention uses binary printing data.
[Drawing 17] It is the contents explanatory view of image-data box IB in the case of using the multiple-value gradation nozzle check pattern concerning the operation gestalt of this invention.
[Drawing 18] It is the contents explanatory view of image-data box IB in the case of using the multiple-value gradation nozzle check pattern concerning the operation gestalt of this invention.
[Drawing 19] It is the contents explanatory view of image-data box IB in the case of using the multiple-value gradation nozzle check pattern concerning the operation gestalt of this invention.
[Drawing 20] It is the contents explanatory view of image-data box IB in the case of using the multiple-value gradation nozzle check pattern concerning the operation gestalt of this invention.
[Drawing 21] It is the contents explanatory view of the image-data box IB in the case of using the binary gradation printing data at the time of photograph ink use. It comes out.
[Drawing 22] It is the flow chart in the nozzle check mode concerning the operation gestalt of this invention.
[Drawing 23] It is the operation explanatory view of the ink carriage 34 concerning the operation gestalt of this invention.
[Drawing 24] It is the flow chart in the nozzle cleaning mode concerning the operation gestalt of this invention.
[Drawing 25] It is the operation explanatory perspective view of the cleaner putt 100 cleaned for every color nozzle concerning the operation gestalt of this invention.
[Drawing 26] It is the operation explanatory perspective view of the cleaner putt 101 cleaned for every color nozzle concerning the operation

gestalt of this invention.
[Drawing 27] It is the operation explanatory perspective view of the cleaner putt 102 cleaned for every color nozzle concerning the operation gestalt of this invention.
[Drawing 28] It is the flow chart of the ink head nozzle diagnostic mode of the ink jet printer A with image ****** concerning the operation gestalt of this invention.
[Description of Notations]
A An ink jet printer with scanner equipment
1 Image Reader (Scanner)
2 Color-Coordinate-System Transform Processing
3 CPU
7 Test Pattern Image Data ROM
10 Display
13 Image-Data Image-Processing Section
14 Head Control Section
15 Print Head Section
17 Scanner Section
18 Printer Section
39 Nozzle Cleaning Section
40 Ink Head
41 Ink Nozzle
IB Image-data box
CH Head for cyanogen
MH Head for Magentas
YH Head for yellow
BH Head for black
100, 101, 102 Cleaner pad

[Translation done.]

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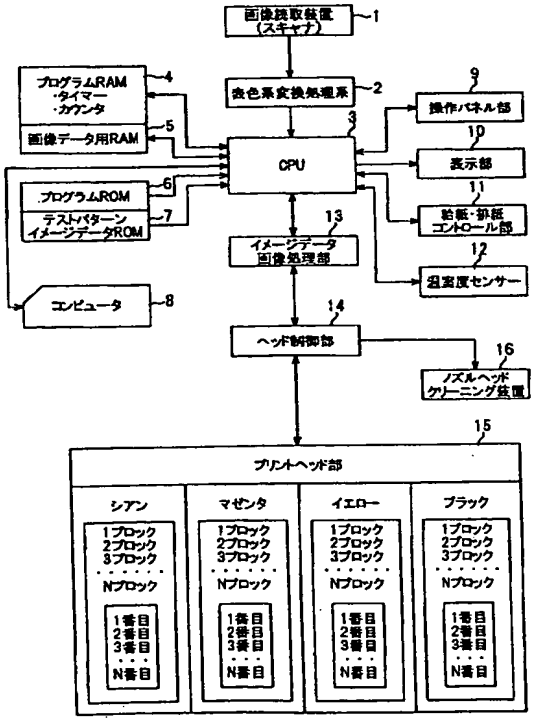
(54)【発明の名称】　画像読取装置付きインクジェットプリンタ及びそのプリントノズルの処理方法

(57)【要約】
【課題】プリントノズルの目詰まりが発生している場合において、正しく不良発生箇所を検出しユーザーに警告を表示し、場合によっては自動的にノズル目詰まりのメンテナンスを行ない、これによって、目詰まりを無くし正規のノズル状態で印字可能にし、常に安定した高画質なプリントサンプルが得られる装置、方法を提供すること
【解決手段】　インクジェットプリンタＡのインクノズル４２が正しく機能しているかテストパターンを印字し、その印字サンプルを画像読取り装置１によってイメージデータを読取りその結果からインクノズル２４の不良を検出するイメージデータ画像処理部１３を具備し、不良ノズルがあると判断した場合はユーザーに対しメッセージを表示するか、又は、自動的にクリーニング動作を行なう。また、クリーニング動作を行ってもテスト印字が良好にならない場合はインクヘッド交換のメッセージする。



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【特許請求の範囲】

【請求項１】　原稿台に載置された原稿に照射した光の反射光により原稿画像を読み取り、画像データに処理する画像読取装置と、画像データに基づいてプリントノズルからインクを吐出して記録媒体に画像を印字するインクジェットプリンタとを有する画像読取装置付きインクジェットプリンタにおいて、

テスト印字用のテスト画像データを記憶する第１の記憶領域と、

前記テスト画像データを前記インクジェットプリンタでテスト印字し、該テスト印字画像を前記画像読取装置により読み取ったテスト印字画像データを、該インクジェットプリンタのプリントノズル又はノズル群と対応付けて記憶する第２の記憶領域と、

前記第２の記憶領域に記憶されたテスト印字画像データに基づき、不良プリントノズル又はノズル群を検出する検出手段とを設けたことを特徴とする画像読取装置付きインクジェットプリンタ。

【請求項２】　前記検出手段で検出された不良プリントノズル又はノズル群を清掃する清掃手段を備えたことを特徴とする請求項１に記載の画像読取装置付きインクジェットプリンタ。

【請求項３】　原稿台に載置された原稿に照射した光の反射光により原稿画像を読み取り、画像データに処理する画像読取装置と、画像データに基づいてプリントノズルからインクを吐出して記録媒体に画像を印字するインクジェットプリンタとを有する画像読取装置付きインクジェットプリンタのプリントノズル処理方法であって、

前記インクジェットプリンタによりテストパターンを記録媒体に印字するテスト印字工程と、

前記テスト印字工程で印字されたテストパターンを、前記画像読取装置にて読込み、画像データに処理するテストパターン読取工程と、

テストパターン読取工程の画像データを、前記インクジェットプリンタのプリントノズル又はノズル群と対応づけて記憶手段に記憶する記憶工程と、

記憶手段に記憶された画像データを閾値処理して不良プリントノズル又はノズル群を検出する不良検出工程とを有することを特徴とする画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

【請求項４】　所定規則に基づき自動的にテスト印字工程を行うことを特徴する請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

【請求項５】　前記不良検出工程前に、前記テスト印字工程、及び／又は、テストパターン読取工程を複数回行うことを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

【請求項６】　前記不良検出工程は、印字するテストパターンの種類に応じて閾値を変化させることを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

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【請求項７】　前記テスト印字工程は、印字に使用する、又は印字に使用したプリントノズル或いはノズル群に対してのみ行うことを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

【請求項８】　前記検出工程で検出した不良プリントノズル又はノズル群を清掃する清掃工程を有することを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

【請求項９】　前記清掃工程後に、再度、前記テスト印字工程を行い、目詰まりプリントノズル又はノズル群がある場合には、プリントノズル又はノズル群の交換をユーザに警告することを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、画像読み取り装置付きインクジェットプリンタにおけるプリントノズル機能を検知、メンテナンスに関する。

【０００２】

【従来の技術】従来、インクジェットプリントのプリントノズルのチェックを行なう為にテストパターンを印字し、その印字サンプルをユーザーの目視によってノズル不良が発生しているかどうかを判断していた。

【０００３】また、特開平１０－２５８５０３に記載されているようなインクジェットプリンタキャリッジ上に設置された光学センサによってテストパターンを読み取り非噴射ノズルを検知する方法が知られている。

【０００４】

【発明が解決しようとする課題】しかしながら、目視にて印字サンプルを判断する場合には、ユーザーそれぞれの主観による差が生じ、ノズル目詰まりが発生しているにもかかわらず誤って良好と判断されてしまう場合があった。

【０００５】また、特開平１０－２５８５０３に記載されるような手段による場合には、ノズル目詰まりが発生しているか否か（ＯＮ／ＯＦＦ）を漠然と検出するために、目詰まりが発生している（ＯＮ）と検出された場合には全ノズルをクリーニングするものであり、つまりクリーニングが不必要部分についてもクリーニングが行われるのでインクを無駄に消耗し、不経済であるとして問題となっていた。また、通常は使用せず、ユーザがプリントノズルの目詰まりを感じた時にのみ使用する光学センサを改めて設ける必要があり、大変に非効率的な装置となってしまものであった。

【０００６】本発明は、前記の問題点を解消するためなされたものであって、プリントノズルの目詰まりが発生

している場合において、正しく不良発生箇所を検出しユーザーに警告を表示し、場合によっては自動的にノズル目詰まりのメンテナンスを行ない、これによって、目詰まりのないノズル状態で印字可能にし、常に安定した高画質なプリントサンプルが得られる装置、及びそのノズルの処理方法を提供することを目的とする。

【０００７】また、１ｄｏｔの印字に対し階調表現可能なインクヘッドの場合や、彩度が低いインクを用いているインクヘツドの場合に於いても、プリントノズル不良をチェック可能とする事をも目的とする。。

【０００８】また、クリーニング動作には必要最低限のインク量及び時間で動作が終了する様にする事をも目的とする。

【０００９】また、クリーニング不可能なノズル不良である場合はユーザーに対しインクヘッド交換のメッセージを提供する事をも目的とする。

【００１０】

【課題を解決するための手段】本発明は、上記の目的を達成するため、次の構成を有する。請求項１の発明は、原稿台に載置された原稿に照射した光の反射光により原稿画像を読み取り、画像データに処理する画像読取装置と、画像データに基づいてプリントノズルからインクを吐出して記録媒体に画像を印字するインクジェットプリンタとを有する画像読取装置付きインクジェットプリンタにおいて、テスト印字用のテスト画像データを記憶する第１の記憶領域と、前記テスト画像データを前記インクジェットプリンタでテスト印字し、該テスト印字画像を前記画像読取装置により読み取ったテスト印字画像データを、該インクジェットプリンタのプリントノズル又はノズル群と対応付けて記憶する第２の記憶領域と、前記第２の記憶領域に記憶されたテスト印字画像データに基づき、不良プリントノズル又はノズル群を検出する検出手段とを設けたことを特徴とする画像読取装置付きインクジェットプリンタである。

【００１１】請求項２の発明は、前記検出手段で検出された不良プリントノズル又はノズル群を清掃する清掃手段を備えたことを特徴とする請求項１に記載の画像読取装置付きインクジェットプリンタである。

【００１２】請求項３の発明は、原稿台に載置された原稿に照射した光の反射光により原稿画像を読み取り、画像データに処理する画像読取装置と、画像データに基づいてプリントノズルからインクを吐出して記録媒体に画像を印字するインクジェットプリンタとを有する画像読取装置付きインクジェットプリンタのプリントノズル処理方法であって、前記インクジェットプリンタによりテストパターンを記録媒体に印字するテスト印字工程と、前記テスト印字工程で印字されたテストパターンを、前記画像読取装置にて読込み、画像データに処理するテストパターン読取工程と、テストパターン読取工程の画像データを、前記インクジェットプリンタのプリントノズル又はノズル群と対応づけて記憶手段に記憶する記憶工程と、記憶手段に記憶された画像データを閾値処理して不良プリントノズル又はノズル群を検出する不良検出工程とを有することを特徴とする画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１３】請求項４の発明は、所定規則に基づき自動的にテスト印字工程を行うことを特徴する請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１４】請求項５の発明は、前記不良検出工程前に、前記テスト印字工程、及び／又は、テストパターン読取工程を複数回行うことを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１５】請求項６の発明は、前記不良検出工程は、印字するテストパターンの種類に応じて閾値を変化させることを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１６】請求項７の発明は、前記テスト印字工程は、印字に使用する、又は印字に使用したプリントノズル或いはノズル群に対してのみ行うことを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１７】請求項８の発明は、前記検出工程で検出した不良プリントノズル又はノズル群を清掃する清掃工程を有することを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１８】請求項９の発明は、前記清掃工程後に、再度、前記テスト印字工程を行い、不良プリントノズル又はノズル群がある場合には、プリントノズル又はノズル群の交換をユーザに警告することを特徴とする請求項３に記載の画像読取装置付きインクジェットプリンタのプリントノズル処理方法である。

【００１９】請求項１の発明によれば、第１の記憶領域に記憶されたテスト印字用のテスト画像データに基づいて、そのテスト画像データをインクジェットプリンタでテスト印字する。そしてそのテスト印字画像をインクジェットプリンタに併設した画像読取装置により読み取り、その読み取り結果であるテスト印字画像データを、そのテスト印字のために使用したインクジェットプリンタのプリントノズル又はノズル群と対応付けて第２の記憶領域に記憶する。よって、その第２の記憶領域に記憶されたテスト印字画像データと対応するプリントノズル又はノズル群との関係から検出手段が、目詰まり等の不良プリントノズル又はノズル群を検出することができる。従って、インクジェットプリンタに併設した、通常ファクシミリやコピーに使用する画像読取装置を有効活用して、プリントノズル又はノズル群の不良を検出し、

それに基づきメンテナンスができるので、常に良好状態で印字可能な画像読取装置付きインクジェットプリンタとできる。

【００２０】請求項２の発明によれば、請求項１の発明の作用効果に加えて、検出手段で検出された不良プリントノズル又はノズル群を清掃する清掃手段を備えることで、プリントノズル又はノズル群の不良が目詰まりのような場合に清掃することで目詰まりを回避できることとなる。

【００２１】請求項３の発明によれば、テスト印字工程でインクジェットプリンタによりテストパターンが記憶媒体に印字され、テストパターン読取工程を通じてその印字されたテストパターンが画像データに処理され、その画像データをインクジェットプリンタのプリントノズル又はノズル群と対応づけて記憶手段に記憶し、その記憶された画像データを不良検出工程にて閾値処理することで不良プリントノズル又はノズル群を検出する。従って、既に備えてあるファクシミリやコピーに使用する画像読取装置を用いるので、簡単な手段にてプリントノズル又はノズル群の不良を検出できる。

【００２２】請求項４の発明によれば、請求項３の発明の作用効果に加え、所定規則に基づき自動的にテスト印字工程を行うために、プリントノズルの目詰まり等の不良を適切に検出でき、それに伴って適切な時期でのメンテナンスが可能となる。よって、常に良好状態で印字ができる。

【００２３】請求項５の発明によれば、請求項３の発明の作用効果に加え、不良検出工程前にテスト印字工程やテストパターン読取工程を複数回行うことで、正確なテスト印字やテストパターン読取が可能となり、不良検出工程での検出精度の向上により不良検出工程での誤検出を減らすことができる。

【００２４】請求項６の発明によれば、請求項３の発明の作用効果に加えて、印字するテストパターンの種類に応じて不良検出工程での閾値を変化させるので、例えば、階調性のあるテストパターンに対して閾値を変化させることで淡い色なども正確に検出でき、不良検出工程での誤検出を減らすことができる。

【００２５】請求項７の発明によれば、請求項３の発明の作用効果に加えて、印字に使用予定、又は印字に使用したプリントノズル或いはノズル群に対してのみテスト印字工程を行うので、テスト印字工程で使用するインク量、処理時間を必要以上に費やすことを減らすことができる。よって、効果的なプリントノズル処理が可能となる。

【００２６】請求項８の発明によれば、請求項３の発明の作用効果に加えて、検出工程で検出した不良プリントノズル又はノズル群を清掃する清掃工程を設けたことで、不良プリントノズルが目詰まりであって洗浄等を行うことで回避できるものは自動的にメンテナンスされることとなり、よりユーザーフレンドリーな使いやすい画像読取装置付きインクジェットプリンタとなる。

【００２７】請求項９の発明によれば、請求項３の発明の作用効果に加えて、清掃工程後に、再度、前記テスト印字工程を行い、依然として不良プリントノズル又はノズル群がある場合には、プリントノズル又はノズル群の交換をユーザに警告するのでユーザは適切なタイミングによりプリントノズルの交換が可能となる。よって、ユーザーはプリントノズルの交換等を意識することなく使用することができるとともに、常に良好状態で印字ができる。

【００２８】

【発明の実施の形態】以下、図面を参照して本発明の実施形態を詳細に説明する。本発明の画像読み取り用スキャナ装置付きインクジェットプリンタＡのシステム全体のブロック図を図１に示す。図１中の、１はスキャナやコピー等に用いられる画像読取り装置、２は表色系変換処理系、３はＣＰＵ、４はプログラムＲＡＭ、５は画像データ用ＲＡＭ、６はプログラムＲＯＭ、７はテストパターンイメージデータ、８はコンピュータ、９は換作パネル部、１０は表示部、１１は給紙・排紙コントロール部、１２は温室度センサー、１３はイメージデータ画像処理部、１４はヘッド制御部、１５はプリントヘッド部、１６はノズルクリーニング装置である。

【００２９】画像読み取り装置１であるスキャナではコピーしたり、取り込みたい原稿画像をＣＣＤ（Charge Coupled Device）で１ラインずつ走査し画像濃度に応じてデジタル信号に変換し、Ｒ（レッド)／Ｇ(グリーン)／Ｂ(ブルー)イメージデータの画素毎の感度ばらつきと照明むらの補正であるシェーディング処理を実施し出力する装置である。

【００３０】表色系変換処理系２は、スキャナ１から送られてくるＲ／Ｇ／ＢイメージデータをＣ（シアン）／Ｍ（マゼンタ）／Ｙ（イエロー）／Ｋ（ブラック）のイメージデータに変換しＣＰＵ３に送るための処理を行う。

【００３１】ＣＰＵ３は、プログラムＲＡＭ４、画像データ用ＲＡＭ５、プログラムＲＯＭ６、テストパターンイメージデータＲＯＭ７、換作パネル９、表示部１０、給紙・搬送のコントロール部１１、温湿度センサー１２、画像処理部１３に接続されており、プログラムＲＯＭ６に格納されたプログラムに従い動作する。

【００３２】ＲＡＭ４、５はＣＰＵ３の作業用の記憶領域として用いられ、種々のシステム内の情報や画像データの記憶にも使用される。それぞれのＲＯＭ６、７はＣＰＵ３の動作プログラムやそれぞれのシステムモジュールを動作させる為のプログラム、テストパターン印字を行うためのイメージデータ等、電源が遮断されても保持しなければならない内容を記憶してある。

【００３３】操作パネル部９はユーザーからの各種入力

を受付て、ＣＰＵ３にその情報を送る操作部であり、表示部１０はユーザーに対し各種システムの状態を表示しメッセージする表示部である。給紙・排紙コントロール部１１は、ＣＰＵ３からの情報に対し印刷媒体の給紙・搬送を制御を行う。

【００３４】温湿度センサー１２は、スキャナ装置付きインクジェットプリンタＡ各部の動作環境をモニターする各種センサーであり、イメージデータ画像処理部１３は画像読み取り装置１（スキャナー）から送られて来たイメージデータを一時蓄積しそのイメージデータが文字画像か写真画像か判別したり、その画像にフィルタ処理を施したり、中間調処理などを行う処理装置で、ノズルテストパターンの比較処理をも行われる。

【００３５】ヘッド制御部１４は、イメージデータ画像処理部１３から送られてきたイメージデータをプリントヘッド部１５で処理できるように制御したり、キャリッジ３４（図４参照）のコントロールを行う。プリントヘッド部１５は、前記ヘッド処理部１４からの情報によって各色のインクを印刷媒体に印字する吐出装置である。ノズルクリーニング装置１６は、プリントヘッド部１５に設けた、インクを吐出する印字用のノズル不良が発生したときに、不良ノズルの清掃を行うものである。

【００３６】図２は、スキャナ装置付きインクジェットプリンタＡ全体の概略斜視図であり、画像読み取り装置であるスキャナ部１と印字を行うプリンタ部１８から概略構成されている。スキャナ部１は、原稿を置く原稿台１９とそれを押さえ、また後述するランプ２８からの照射光、及び反射光が漏れないようにする原稿カバー２０を有し、スキャナ部１内の概略構成については図３を参照して説明する。

【００３７】図３は、スキャナ内部１７の光学系を作用的に示す概略断面図である。無色透明の板ガラスであるプラテンガラス２５上に原稿２６がセットされて、画像読み取り命令がなされると、プラテンガラス２５の下方に位置し、かつプラテンガラス２５に向けて光を照射するように配置した照明光源ランプ２８が点灯し、この照射光が原稿２６に照射射され、照らされた光は原稿２６上に描かれた色に応じてある波長の光を反射する。この反射された波長の光は、ミラー２９、３０、及び３１、スルーレンズ３２を介してＣＣＤ３３に入射される。ＣＣＤ３３に入射された光は光量に応じて電気信号に変換される。この時、カラー画像の読み取りの場合にはＲＧＢの各波長域毎に電気信号に変換される。なお、標準白板２７は原稿２６の読み取りを実行する前に画素毎の感度ばらつきと照明むらの補正を行うシェーディング処理を実行する為に用いる白板である。

【００３８】また、図２に示すプリンタ部１８は、プリンタ本体と、例えば紙、ＯＨＰ用紙等の印刷媒体をセット収納しておく給紙部２１と、印刷が終了した前記印刷媒体を排出する排紙部２２、及び装置Ａ全体に対してユーザーが指示を行う為の操作パネル９と表示部１０を備えている。プリンタ本体内部の詳細については、図４を参照して説明する。

【００３９】図４は、印字を行うためのプリンタ部１８の内部概略構成を作用的に斜視図にて示している。インクジェットプリンタＡ自体は、図５に示されるようなインクヘッド４０とインクタンク４１が一体になつた各色のカートリッジを乗せたキャリッジ３４と、キャリッジ３４が走査し印刷媒体Ｐとのギャップを一定に保つためのキャリッジシャフト３５と、そのキャリッジ３４を走査させるためのキャリッジモータ３６とキャリッジモータ３６の回動と同調して回動するロータ３６Ａと従動ローラ３６Ｂに巻架するキャリッジベルト３７と、印刷媒体Ｐを誘導する搬送ローラ３８と、及びキャリッジシャフト３５の端部近傍に設けたインクヘッド４０のインクノズル４２のクリーニングを行うヘツドクリーニング部３９により概略構成されている。

【００４０】キャリッジ３４はその下部に、キャリッジシャフト３５が摺動自在に貫通係合するとともに上側面にはキャリッジベルト３７が固定されている。よって、キャリッジモータ３６が回動すると、その回転はキャリッジベルト３７に伝達されて、それに同調してキャリッジ３４がキャリッジシャフト３５とキャリッジベルト３７に支持されながら往復動することとなる。そして、キャリッジ３４の往復動する位置の下方に沿って印刷媒体Ｐを誘導する搬送ローラ３８を設けているので、印刷媒体Ｐは搬送ローラ３８とキャリッジ３４間を通過することとなり、印刷命令にあわせて搬送ローラ３８とキャリッジモータ３６の回転を制御しながらインクヘッド４０面に配列状に形成したインクノズル４２からインクを吐出することで印刷媒体Ｐに原稿画像の印字が可能となる。尚、より正確な印字を行うためにキャリッジモータ３６等は、位置制御可能なサーボモータ等により駆動されている。

【００４１】上記構成におけるインクジェットプリンタＡの印字工程の概略を説明する。まず、用紙Ｐがプリンタ部１８に繋がる給紙部２１に載置され、コンピュータ等からの画像情報に基づく印字要求又は、プラテンガラス２５上に原稿２６が置かれユーザーによって操作パネル部９上のコピーボタンが押された場合は、用紙Ｐが給紙部２１から搬送され、プリンタ部１８に到達する。

【００４２】プリンタ部１８は、インクキャリッジシャフト３５に支持されたインクキャリッジ３４を走査し、それに伴って画像情報に対応して必要なインクヘッド４０よりインクを吐出することで用紙Ｐ上に画像情報を印字する。この時、用紙は一旦停止し、インクキャリッジ３４が１ライン（１方向）の走査が終了した時点でインクヘツド４０が有する複数のインクノズル分に相当する用紙Ｐの搬送がなされる。このようにプリンタ部１８において画像情報に対応して上記処理が継続して実施され

る事によって用紙Ｐ上にインクによる画像情報が書き込まれる。記録された用紙Ｐは、排紙部２２であるトレイに排出され印字物としてユーザに提供される。

【００４３】図６は、インクジェットプリンタＡのインクヘッド４０の斜視図を示しており、通常黒インキ（Ｋ）、シアンインキ（Ｃ）、マゼンタインキ（Ｍ）、イエローインキ（Ｙ）の各ヘッドを備え、各ヘッドには移相をズラして配列した微細穴であるなインクノズル４２が施されている。本実施形態では、各行を構成する３個のノズル位置をずらしたものを１ブロックとしてｎブロック並列形成してｎ行３列を単位とするシアンヘッドＣＨ、マゼンタヘッドＭＨ、イエローヘッドＹＨを該順序で平行に配置している。また、前記３ヘッドＣＨ、ＭＨ、ＹＨの列方向に隣接して、該３ヘッドＣＨ、ＭＨ、ＹＨを合わせたものと同一構成の黒ヘッドＫＨを設けている。尚、本実施形態ではヘッドの配列をｎ行３列にて説明したがこれに限定されるものではない。また、前記各インクノズル４２の１つのノズル径は数十μｍで構成され、超微細加工技術で作られている。

【００４４】前記インクヘッド４０の拡大図を図７に示す。このインクノズル４２は画像形成上最も画質に影響を及ぼす部分であり、インクノズル４２へのインク、ゴミ等の目詰まり等が発生するとたちまち画質劣化を引き起こすこととなる。このインクノズル４２からのインクの吐出方法には現在大きく分けて２種類あり、その吐出原理を図８に示す。その１として、図８（ａ）のピエゾ素子４３の変形によってインク室４４のインクを吐出させるピエゾ方式と、その２として図８（ｂ）のノズル内にセラミックヒーター４５を備え熱によって発生する気泡によってインク室（ノズル）４６内のインクを吐出させるバブルジェット方式又はサーマル方式とがある。

【００４５】また、インクジェットプリンタの重要な要素として、インクの技術がある。インクはハードの信頼性を左右し最終アウトプットである印刷品質に大きく寄与している。インクは着色剤である染料、インク中の固形分析出やインクの乾換を防止する湿潤剤、ＰＨやインク物性を調整するための添加剤、そして浸透剤といった多くの化学物質からなる。

【００４６】次に、上記説明したスキャナ装置付きインクジェットプリンタＡのインクノズル４２が正しく機能しているか診断する為のテスト印字モードを図１、９のフローチャートを参照しつつ説明する。テスト印字モードに入るとＣＰＵ３はＲＯＭ７に記憶してあるテストパターンのイメージデータをロードして画像処理部１３へ転送する（Ｓ１、Ｓ２）。データを受け取った画像処理部１３は、転送されたテストパターンのイメージデータをヘッド制御部１４へ送り、ヘッド制御部１４へ送られてきたイメージデータはプリントヘッド部１５に送られてそのテストパターンが用紙Ｐに印字される（テストパターン印字サンプル）（Ｓ３）。

【００４７】上記テストパターン印字サンプルの一例を図１０に示す。本実施形態のテストパターンは、シアン用ヘッドＣＨ、マゼンタ用ヘッドＭＨ、イエロー用ヘッドＹＨ、ブラック用ヘッドＫＨのそれぞれ１番目のノズルから１ｄｏｔずつ順に全ノズルからインクを吐出し紙面上に打ち出され、図１０に示すように各色サンプルは斜線状態にパターン印字が行われる。この直線状のテストパターン破線部分を読み取る事によって何番目のインクノズル４２が目詰まりしているかを検出するものである。

【００４８】次に、上記のテストパターン印字出力サンプルを画像読み取り装置１であるスキャナで読み取る（Ｓ４）。このスキャナの読み取りの解像度はインクノズル４２の解像度と同じか、あるいはそれ以上であることが望まれる。もし、インクノズル４２より低い解像度のスキャナで読み取った場合、印字された１ｄｏｔが半分ぐらいしか読みとれず１画素としてスキャナ側では認識できなかったり、２ｄｏｔが１画素として読み取ってしまうなどのノズルの目詰まりの検出に対し誤判定をしてしまう可能性があるからである。

【００４９】次に、スキャナ１で読み取られたテスト印字パターンのイメージデータは、表色系変換系２でシアン、マゼンタ、イエロー、ブラックのデータに変換されＣＰＵ３を介してイメージデータ画像処理部１３に入力される。ここで、各画素毎の認識結果としきい値とを比較し、閾値より大きい認識結果である時にはノズル不良無しと判断し、全ての画素について同様に閾値処理した結果、ノズル不良が無かった場合にはノズルテスト印字モードは終了する（Ｓ５、６、７、８及び１０）。しかし、１画素でも比較結果に閾値よりも小さい画素がある場合にはノズル不良と検出し、ＣＰＵ３は表示部１０にノズルクリーニング指示の表示を行う（Ｓ９、１０）。

【００５０】図１１は、上記説明したテスト印字モードに移行する条件をブロック図にて一覧したもので、図１２に操作パネル９と表示部１０の一例を示している。装置Ａの電源７２がオンした時（Ｓ２０）に予めＲＯＭ６に記憶しているプログラムによってインクノズル４２のテスト印字モード（Ｓ３３）に入るように設定するものである。これにより装置Ａが長期放置されていた間によるノズル目詰まりが発生する場合があるが、使用時には常に安定した高画質な印字を可能とするものである。また、逆に装置Ａの電源７２がオフされた時（Ｓ２１）、予めＲＯＭ６に記憶しているプログラムによってインクノズル４２のテスト印字モード（Ｓ３３）に入るように設定してもよい。これにより次の使用までに長期放置されても、ノズル目詰まりの発生を予め予防し、常に安定した高画質な印字が可能となる。

【００５１】また、装置ＡのＣＰＵ３内に備えられた図示しないタイマーによって、放置時間をモニターし、一定時間以上に放置された場合（Ｓ２２）に、は記憶して

いるプログラムによってノズル４２のテスト印字モード（Ｓ３３）に入るように設定されている。装置Ａをユーザが見て頻繁に使用しているものと長期使用していないものの区別は大変難しいものであるが、もし経験的に放置期間とノズル目詰まり発生との関係がわかる場合には、予めその期間を記憶しておくことで長期放置されていた場合であっても、ノズル目詰まりに対して対策が施され常に安定した高画質な印字が可能となる。

【００５２】また、装置ＡのＣＰＵ３内に備えられた図示しないプリント枚数カウンタを介してある一定以上の値に到達したとき（Ｓ２３）、ノズルテスト印字モード（Ｓ３３）に入るように設定されている。印字回数の増加により、インク粕やゴミがノズルに詰まる蓋然性が高いので、プリント枚数カウンタにて監視しておくことで、常に安定した高画質な印字が可能となる。同様の理由から、装置ＡのＣＰＵ３内に備えられた図示しないプリント時間タイマーを介してある一定以上の値に到達したとき（Ｓ２４）、ノズルのテスト印字モード（Ｓ３３）に入るように設定されている。これにより印字回数の増加によるノズル目詰まりに対して対策が施され常に安定した高画質な印字が可能となる。

【００５３】また、ＣＰＵ３内に設けた図示しないｄｏｔ印字カウンタを介してある一定以上の印字値に到達したとき（Ｓ２５）、ノズル４２にインク粕やゴミがノズルに詰まる蓋然性が高いので、テスト印字モード（Ｓ３３）に自動的に入るように設定されている。これにより印字回数の増加によるノズル目詰まりに対して対策が施され、常に安定した高画質な印字が可能となる。また同様に、ＣＰＵ３内に備えられた図示しないｄｏｔ印字タイマーを介してある一定以上の印字時間に到達したとき（Ｓ２６）、ノズルのテスト印字モード（Ｓ３３）に入るように設定され、印字回数の増大によるノズル目詰まりに対して対策が施され常に安定した高画質な印字が可能となる。

【００５４】また、装置Ａの操作部９又は、コンピュータ８からのプリント指示命令が出された時（Ｓ２７）、そのプリントを実行する前にインクノズル４２のテスト印字モード（Ｓ３３）に入るように設定されている。これにより長期放置によるノズル目詰まりに対して印字動作前にノズル目詰まりに対して対策が施され、常に安定した高画質な印字が可能となる。

【００５５】また操作部９又は、コンピュータ８からのプリント指示命令の用紙選択において高品位な印字媒体が選択されていた時（Ｓ２８）、そのプリントを実行する前にノズルのテスト印字モード（Ｓ３３）に入るように設定できる。これにより長期放置によるノズル目詰まりに対して高価な印字媒体の無駄な使用を減らし、常に安定した高画質な印字が可能となる。

【００５６】また装置Ａのプリンタ部１８からのプリント終了命令が出された時（Ｓ２９）、ノズル４２のテスト印字モード（Ｓ３３）に入るように設定できる。これにより印刷時による紙粉などによるノズル目詰まり対策が可能となり、常に安定した高画質な印字が可能である。

【００５７】また、装置Ａのプリンタ部１８からプリント終了命令が出され且つその時に使用した用紙が普通紙か又はそれ同等以下の印字媒体が選択されていた時（Ｓ３０）、そのプリントを実行する後にノズルのテスト印字モード（Ｓ３３）に入るように設定できる。これにより印字時による紙粉などによるノズル目詰まりに対して高価なインクヘッド４２の無駄や目詰まりを防止し、常に安定した高画質な印字が可能となる。

【００５８】また、装置Ａの温湿度センサー１２を介して装置Ａの設置環境の変化をモニターしその環境変化が大きい時（Ｓ３１）、テスト印字モード（Ｓ３３）に入るように設定するものである。これにより乾燥等によるノズル目詰まりに対して高価なインクヘッド４２の無駄な目詰まりを防止し、常に安定した高画質な印字が可能である。

【００５９】また、装置Ａの操作部９上に備えられたテストパターン印字モードの選択ボタン７４を介してユーザーが所望する時（Ｓ３２）、テスト印字モード（Ｓ３３）に入るように設定するものである。これにより通常とは違うユーザーが使用する特別な時であっても目詰まりによる画像劣化を防止し、常に安定した高画質な印字が可能となる。

【００６０】また、操作部９上に有るクリーニングモードボタン７３を押すことによってインクヘッド４２のクリーニングを選択することができる。

【００６１】次に、前記説明したノズルテスト印字条件（Ｓ２０～Ｓ３２）等の下でテスト印字モード（Ｓ３３）が設定されると、プログラムＲＯＭ６に記憶されているプログラムの指示に従ってＣＰＵ３はテストパターンイメージデータをロードし、プリンタ１８部へロードされたテストパターンメージデータが印字実行させる。このテストパターンは、シアン用ヘッドＣＨ、マゼンタ用ヘッドＭＨ、イエロー用ヘッドＹＨ、及びブラック用ヘッドＢＨのインクノズル一番目から単色で１画素ずつ順番にインクが吐出されてテストパターンとなる。

【００６２】図１３は、不良のない所定インクノズル４２を用いてテストパターンの印字回数を１回でなく複数回実行した場合のテストパターンの印字状態について実験結果を示している。図１３では、横軸をテストパターンの印字枚数、縦軸をノズル不良判定結果正解率としたグラフである。該グラフからわかるように、テストパターンの印刷実行回数（枚数）が１回の場合と複数回の場合では、正しく印字する正解率は複数回印字した方が良くなっていることがわかった。

【００６３】次に上記した条件により印字したテストパターンから、インクノズル４２の目詰まり箇所の検出手

段について説明する。本実施形態では画像読み取り装置（スキャナ）１を有効利用して印字されたテストパターンを読込み、本来読み込まれるべき画素が読み込まれていない画素を検出して不良ノズル箇所を特定する。

【００６４】具体的には、まずテストパターンサンプルを無色透明の板ガラスであるプラテンガラス２５上にセットし、ランプ２８により光を原稿に照射し、原稿上に描かれた色に応じた波長の反射光を各ミラー２９、３０、３１、及びスルーレンズ３２を介してＣＣＤ３３に入射する。ＣＣＤ３３に入射した光は光量に応じて電気信号に変換され、この時、カラー画像の読み取りの場合にはＲＧＢの各波長域毎の電気信号に変換される。このＲ／Ｇ／Ｂのそれぞれのイメージデータは主走査方向１列に並べられたＣＣＤの個々のばらつきや照明光源ランプの発光分布特性の補正させる為のシェーディング処理を施し、次の表色系変換の処理によってＲ／Ｇ／Ｂの信号からシアン／マゼンダ／イエロー／ブラックの信号に変換する。この時の解像度は３００ｄｐｉのスキャナを用いた時、１画素のｄｏｔ径は約８０～８５μｍで、６００ｄｐｉの時は４０～４５μｍで構成されている。ここで、テストパターン印字を行ったノズル４２の解像度が３００ｄｐｉでスキャナ１側の解像度と同じ場合は問題無いが、違う場合は同じ解像度になるよう解像度変換処理を行わなくてはならない。

【００６５】また、この入力系の読み取りデータは処理系の誤差を含み多少ばらつきが生じてしまうので、チェック印字パターンの読み取りを回数を選択自在とし、読み取り回数に対する読み取り精度実験を行った結果を図１４に示す。図１４では、横軸に読み取り回数、縦軸にノズル目詰まり状態判断結果正解率を示しており、印字パターンの読み取り回数が１回の場合と複数回の場合ではノズルの目詰まり状態を正しく判断した正解率は複数回読み取った方が良くなっていることがわかった。よって、本実施形態では読み取り精度を上げるために複数回の読取処理を行う。

【００６６】次に、ノズル目詰まりの検出方法について図１、１５のフローチャート及び図１６を参照しつつ説明する。本実施形態で使用したインクヘッド４０は、ノズル数がシアン、マゼンタ、イエローがそれぞれ９９ノズルのものを用い、ノズルの解像度は３００ｄｐｉである。

【００６７】まず前記した条件に基づきノズル印字モードの命令があると（Ｓ４０）、テストパターンが印字され（Ｓ４１、４２）、そのサンプルは画像読み取り装置（スキャナ）１により読み込まれ（Ｓ４３）、画像読み取り装置（スキャナ）１から出力されたイメージデータは画像処理系２において、表色系変換処理が施され（Ｓ４４）、次に印字ノズルと同じ解像度になるように解像度変換される（Ｓ４５）。今回はスキャナ１も３００ｄｐｉのものを使用したので解像度変換は必要なかった。

【００６８】次に、図示しないノズル１番目のｄｏｔスタート位置を検出する検出手段（Ｓ４６）を介して１番目からＮ番目までのイメージデータの入力値を画像処理部１３に準備された図１６（ａ）に示す様なイメージデータボックス（メモリ）ＩＢにノズルと対応付けて順番に入力し（Ｓ４７）、その各入力されたイメージデータをある一定のしきい値と比較判断を行う（Ｓ４８、４９）。イメージデータボックスＩＢは、初期状態では図１６（ａ）に示す状態となっており、ステップ（Ｓ４７）のイメージデータの入力（Ｓ５０）により図１６（ｂ）の各データに変更され、更にステップ（Ｓ５１）の所定閾値処理を通して図１６（ｃ）に示す目詰まりの有無データが作成される。そして、図１６（ｃ）のイメージデータボックスＩＢに基づきイエローノズルの２番目と３番目、マゼンタノズルの９番目９８番目に不良が発生していることが検出されると、表示部１０にノズル不良の警告メッセージを表示し、ユーザはその警告に基づいて清掃、交換等の対応が可能となる（Ｓ５３、５４）。

【００６９】図１６では、２値の印字データの場合についての測定結果を示したが、インクヘッドの種類には多値の階調性をもって淡い色の印字が可能なものもあるで、その多値階調印字可能なノズルを用いたノズル目詰まりの検出方法を説明する。係る場合には、テスト印字パターンとして図１７、１８、１９、及び２０の各（ａ）に示すように、階調性の変化に合わせて予め段階的にメモリーデータを入力するイメージデータボックスＩＢを用意する。そして、テスト印字パターンを印字して読み込んだ結果は、図１７、１８、１９、及び２０の各（ｂ）に示すデータが得られ、更に各段階に応じた閾値により前記データを閾値処理して図１７、１８、１９、及び２０の各（ｃ）結果を得て、ノズル目詰まり状態判断を行う。尚、本実施形態での各段階に応じた閾値は、図１７、１８、１９、及び２０に対して順番に２１４、１５０、９６、３２とした。この処理により、階調性を持った淡いテスト印字サンプルにもノズルの目詰まり状態の判断が適切に可能となる。

【００７０】また、階調性をもった印字は使用するインクの種類によっても可能であるのでその場合について説明する。通常のインクではなく階調性のあるインク、フォトインクを用いた場合について図２１を参照して説明する。イメージデータ入力前では図２１（ａ）に示すようにメモリーしてあるテストパターンは前記普通のインクを用いている場合と同じであるが、テスト印字サンプルを読み取った結果は、イメージデータとしてノズルの印字階調表現能力として最大であったにも関わらず図２１（ｂ）に示すように普通のインクを用いたときの印字階調表現能力が半分の時（図１９）とほぼ同じ値を示すことがわかった。よってインクが彩度の低い場合等には、その条件によりしきい値をそのフォトインクに対応

して変えて比較判断することによって淡い色のフォトインクなどのインクヘッドについても正しく目詰まり状態を検知することが可能となる。

【００７１】前記説明したノズル４２の目詰まりの検出方法では、常に全てのノズルからインクを吐出して不良ノズルの検出を行う場合を説明したが、より効率的、効果的に目詰まりの検出を行うため、より少ないノズルにより検出する方法を説明する。第１の手段としては、レーザプリンタが印字に使用するノズル例えば、モノクロ印刷であれば黒用ヘッドＫＨを、またカラー印刷であれば、シアン用ヘッドＣＨ、マゼンタ用ヘッドＭＨ、イエロー用ヘッドＹＨ等のように後の印刷に使用するノズルヘッド４０を予め目詰まりの検出を行うものである。図２２のフローチャートを参照しつつ詳細を説明する。

【００７２】まず、プリント命令がＣＰＵ３から発信されるとその時に使用するインクヘッド（全ノズル、黒、カラーのみ、フォトカラーノズルのみ）が選択される（Ｓ６１～Ｓ６４）とともに、印字階調性の種類（２階調、多値階調）が選択される（Ｓ６５～Ｓ６７）。そして、選択されたインクヘッド４０と印字階調性の種類に応じて、目詰まり検出を行うノズル４２のノズルチェックが行われる（Ｓ６８～Ｓ８７）。このように、後に使用するインクヘッド４０、インクノズル４２のみに対して予め目詰まりの検出を行うことで、テストパターン印字に必要なインク、処理時間等の削減ができ、効率よくノズル目詰まりについてメンテナンスが行うことが可能となる。

【００７３】第２の手段は、前記第１の手段と逆に事後的に、印字に使用したノズルのみに対して目詰まり検出を行っても効率的な処理が可能になる。この場合には、何れかのメモリーにノズルの使用履歴を示すフラグ領域を設け、前回の印字で使用したノズルヘッド４０に対応するフラグを検索して、その検索したフラグに対応する使用済ヘッド４０、又はノズル４２のみについて目詰まりチェックを行うものである。例えば、前回の印字が黒インクだけの印字だった場合、目詰まり検出は黒用ヘッドＫＨに対してのみ行う事となる。よってこの場合にも、必要最低限度のインク消費で済み処理時間も短縮できる。

【００７４】上記説明した目詰まり検出手段により目詰りが検出されたノズル４２は、ノズルヘッドクリーニング装置１６にて目詰り箇所の清掃が行われる（クリーニングモード）。尚、クリーニングモードへの移行は、ユーザ命令による場合と自動設定による場合との２通りで行うことができる。ユーザ命令による場合には、目詰りノズルが検出された場合にノズル目詰まりのテスト印字出力結果に基づき、表示部１０（図１２参照）上にノズルクリーニング命令の表示によりユーザに警告し、ユーザーのクリーニング動作の実行希望により操作パネル部９上のクリーニングモードボタン７３を介して、インクヘッド４０のノズルクリーニング動作に入る。一方、自動設定的にクリーニングモードへ移行する場合には、目詰りノズルが検出されるとユーザの命令を待たずにインクヘッド４０をノズルヘッドクリーニング装置１６のヘッドクリーニング部３９にて清掃する。

【００７５】インクヘッド部４０のクリーニング動作について図２３に示す。通常、印刷停止後のキャリッジ３４は用紙幅Ｗ１から外側にオーバーラン（助走部）領域Ｗ２上のホームポジションＰ１、又はＰ２の位置に在るが、ノズルクリーニング動作が選択された場合にはキャリッジ３４をノズルヘッドクリーニング装置１６のヘッドクリーニング部３９に移動させてインクヘッド４０のクリーニングを行う。クリーニング終了後は、また通常のホームポジション１又は２に戻る。

【００７６】また、上記インクヘッド４０のクリーニング動作は、インクヘッド４０全面を清掃するが、より効果的に清掃する手段について図２４に示すフローチャートを参照しつつ説明する。上記説明したように目詰まりノズルは使用条件や図１６から２１の各（ｃ）に示すイメージデータボックスＩＢからノズルブロック又はノズル単位で的確に検出できるので（Ｓ９０～９８）、対応するインクヘッドのみクリーニングする事により効率的なクリーニング動作が実現できる（Ｓ９９～１０１）。

【００７７】次に、ヘッドクリーニング部３９の概略図を図４、２５を参照して説明する。例えば、ノズルチェックの結果が図１６（ｃ）のイメージデータボックスＩＢである場合、クリーニングが必要なインクヘッド４０はマゼンタとイエローであるので、ノズルを洗浄するクリーナーパット１００はマゼンタとイエローに対応する部分だけを動作してノズル４２の清掃を行う。これにより、クリーニング動作に必要以上のインク量、クリーニング動作の所用時間が少なくできる。尚、ユーザ命令による場合にはクリーニングの終了に伴いクリーニング終了のメッセージを表示部１０に行なう。

【００７８】図２５の場合には、清掃するインクノズル４２の単位を各色インクヘッド単位で示したが、より望ましくは、各色ノズルを構成する所定ブロック、例えば１行（３ノズル）単位で行うものである。このクリーニングが必要なインクノズルブロックだけをクリーニングするヘッドクリーニング部３９の概略図を図２６に示す。例えば、図１６（ｃ）のイメージデータボックスＩＢ結果に基づいてクリーニングする場合には、クリーニングの必要なインクヘッド４０はマゼンタヘッドの第３ブロックと第３３ブロック、イエローヘッドの第１ブロックであり、その時クリーナーパット１０１はマゼンタヘッドの第３と第３３ブロックとイエローヘッドの第１ブロックだけを動作してノズル４２の清掃を行う。このクリーニング動作により、必要以上のインク量、クリーニング動作の所用時間が少なくできる。

【００７９】また、更に望ましくはインクノズル４２の

清掃を各ノズル単位で行うものであり、そのヘッドクリーニング部３９の概略図を図２７に示す。たとえば図１６（ｃ）の結果の場合、クリーニングが必要なインクヘッドはマゼンタヘッドMHの９番目と９８番目とイエローヘッドＹＨの２番目と３番目であり、クリーナーパット１０２のマゼンタヘッドの９番目と９８番目とイエローヘッドの２番目と３番目に対応する部位だけが動作してノズル４２の清掃を行う。このクリーニング動作によって、必要以上のインク量やクリーニング動作の所用時間をより少なくできる。

【００８０】上記説明ではノズル不良が有ると判断された場合は表示部１０にメッセージをユーザーに警告する場合について説明したが、前記したように自動的にクリーニング動作に入るように設定してもよい。自動的にクリーニング動作に入る場合には、ノズルの清掃終了後、再度のテストパターン印字を行い、その印字データからノズルチェックを再度行い、目詰まりが依然としてある場合には更に、目詰まりノズル又はノズル群の清掃を自動的に繰返し行うことが効果的に可能となる。そして、ノズル４２の清掃を複数回繰り返して行っても目詰まりが解消されない場合には、適切な印字ができないのでユーザにインクヘッド４０の交換メッセージを表示し、インクヘッド４０の交換時期にあることを警告することで、適切なタイミングでインクヘッド４０の交換が可能となり、常に良好な印字が確保される。図２８に、上記したインクヘッド４０の交換を警告する工程のフローチャートを示す。尚、テスト印字モード（Ｓ１１０）から表示部への警告メッセージ表示（Ｓ１２０）までは、前記した所謂テストパターン印字工程と、ノズルの目詰まりテストチェック工程と同一工程であり説明を省略する。

【００８１】まず始めに、読み取りノズル不良の検出工程が行われる（Ｓ１１０～Ｓ１１７）。ノズル不良箇所が検出された場合には、表示部１０への警告メッセージを表示（Ｓ１１９、１２０）すると同時に、ＣＰＵ３ではノズル不良が発生した回数Ｎをカウントする（Ｓ１２１）。そして、ノズル不良が発生した連続回数Ｎが例えば３回未満であれば、インクヘッド４０のクリーニングモード（Ｓ１２２）に移行してインクヘッド４０の清掃を行い、清掃終了後に再びテスト印字モード（Ｓ１１０）に移行する。一方、ノズル不良が発生した連続回数Ｎが３回となった場合には、図示しないヒーター部でのインクの焦げ付き等による修復不可能な異常と判断し、ユーザーに対してインクヘッド４０の交換のメッセージを表示させ（Ｓ１２４）、ノズル診断モードは終了する（Ｓ１２３）。この場合には異常（インクヘッド交換）を知らせるメッセージはＣＰＵ３を介して表示部１０に表示する。

【００８２】以上のようにノズル清掃を複数回行っても目詰まりが解消されない場合には、ユーザにインクヘッド４０の交換時期であることを警告することで、適切なタイミングでインクヘッド４０の交換がなされ、常に良好な印字が確保される。尚、自動的にテスト印字モード（Ｓ１１０）からノズルクリーニングモード（Ｓ１２２）までを行う場合には、排紙部２２に送られたテストパターン印字サンプルを原稿台１９上に導く装置を設ける必要がある。

【００８３】

【発明の効果】以上説明した通り、本発明によれば、画像読取装置付きインクジェットプリンタのノズル機能を診断し、もし、不良箇所を検出すればプリントノズルのメンテナンスを実施することによって、最終的には印刷媒体上に出力される画像として常に安定した高品質な画像を供給することが可能となる。

【００８４】本発明によるればテストパターンを既にスキャナやコピーを行うために併設した画像読取装置（スキャナ）を有効利用して読み取ることで、機械的に画像判定を行うことが可能となるので、改めてノズル機能の診断のために読取装置を取り付ける必要がない。また、主観によるテストパターンの印字判断が無くなり精度のよい結果を得ることができ、誤り判断が無くなる。

【００８５】また、自動的にノズル不良の判断を行うので判断するための時間短縮や、ノズル不良が有った場合クリーニング動作に自動で入るので煩わしい操作が無くなる。

【００８６】プリンタノズルの目詰まりが発生していた場合、ノズル不良発生箇所を判断結果から調査し必要最低限のクリーニング動作でプリンタノズルを清掃するので清掃に必要なインク量や、クリーニング動作の所用時間が削減できる。

【００８７】また、検出工程で印字するテストパターンの種類に応じて閾値を変化して検出を行うことで、淡い色等の印字も適切に不良ノズルを検出できる。

【図面の簡単な説明】

【図１】本発明の実施形態に係る読み画像取装置付きインクジェットプリンタＡのシステムのブロック図である。

【図２】本発明の実施形態に係る読み画像取装置付きインクジェットプリンタＡの斜視図である。

【図３】画像取装置１の光学系の作用的説明図である。

【図４】本発明の実施形態に係るプリンタ部１８の作用的説明図である。

【図５】本発明の実施形態に係るプリンタ部１８のプリントインクヘッド４０の斜視図である。

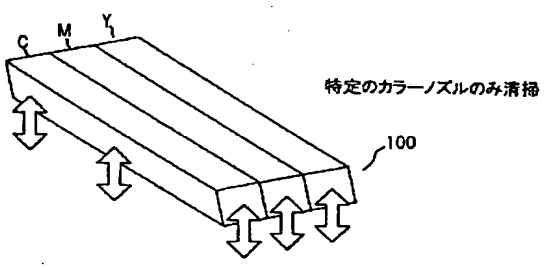
【図６】本発明の実施形態に係るプリントインクヘッド４０の底面図である。

【図７】本発明の実施形態に係るプリントインクヘッド４０の底面の拡大図である。

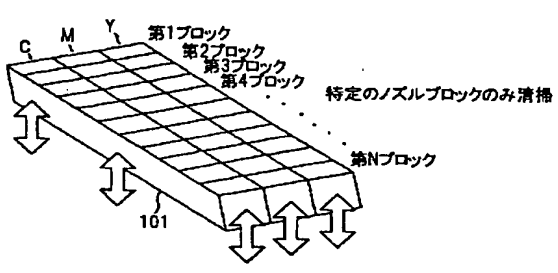
【図８】インクジェットプリンタのヘッドノズルのインク吐出原理（ａ：ピエゾ方式、ｂ：バブルジェット方

式）の作用的説明図である。
【図９】本発明の実施形態に係るテスト印字モードのフローチャートである。
【図１０】テスト印字パターンの説明図である。
【図１１】本発明の実施形態に係るテスト印字モードに移行するための条件を示すブロック図である。
【図１２】本発明の実施形態に係る画像取装置付きインクジェットプリンタＡの操作パネルの概略図である。
【図１３】本発明の実施形態に係る画像取装置付きインクジェットプリンタＡを用いた、テストパターン印字枚数に対するノズル不良判定結果正解率を示すグラフである。
【図１４】本発明の実施形態に係る画像取装置付きインクジェットプリンタＡを用いた、テスト印字パターン読み取り回数に対するノズル不良判断結果正解率を示すグラフである。
【図１５】本発明の実施形態に係る画像取装置付きインクジェットプリンタＡのノズルチェックパターンを用いてノズル不良検出工程のフローチャートである。
【図１６】本発明の実施形態に係るノズルチェックパターンが２値印字データを使用する場合のイメージデータボックスＩＢ内容説明図である。
【図１７】本発明の実施形態に係る多値階調ノズルチェックパターンを使用する場合のイメージデータボックスＩＢ内容説明図である。
【図１８】本発明の実施形態に係る多値階調ノズルチェックパターンを使用する場合のイメージデータボックスＩＢ内容説明図である。
【図１９】本発明の実施形態に係る多値階調ノズルチェックパターンを使用する場合のイメージデータボックスＩＢ内容説明図である。
【図２０】本発明の実施形態に係る多値階調ノズルチェックパターンを使用する場合のイメージデータボックスＩＢ内容説明図である。
【図２１】フォトインク使用時の２値階調印字データを使用する場合のイメージデータボックスＩＢの内容説明図である。である。
【図２２】本発明の実施形態に係るノズルチェックモードのフローチャートである。
【図２３】本発明の実施形態に係るインクキャリッジ３４の作用説明図である。
【図２４】本発明の実施形態に係るノズルクリーニングモードのフローチャートである。
【図２５】本発明の実施形態に係るカラーノズル毎に清掃するクリーナパット１００の作用説明的斜視図である。
【図２６】本発明の実施形態に係るカラーノズル毎に清掃するクリーナパット１０１の作用説明的斜視図である。
【図２７】本発明の実施形態に係るカラーノズル毎に清掃するクリーナパット１０２の作用説明的斜視図である。
【図２８】本発明の実施形態に係る画像取装置付きインクジェットプリンタＡのインクヘッドノズル診断モードのフローチャートである。
【符号の説明】
Ａ　スキャナ装置付きインクジェットプリンタ
１　画像読取り装置（スキャナ）
２　表色系変換処理
３　ＣＰＵ
７　テストパターンイメージデータＲＯＭ
１０　表示部
１３　イメージデータ画像処理部
１４　ヘッド制御部
１５　プリントヘッド部
１７　スキャナ部
１８　プリンタ部
３９　ノズルクリーニング部
４０　インクヘッド
４１　インクノズル
ＩＢ　イメージデータボックス
ＣＨ　シアン用ヘッド
ＭＨ　マゼンタ用ヘッド
ＹＨ　イエロー用ヘッド
ＢＨ　黒用ヘッド
１００、１０１、１０２　クリーナパッド

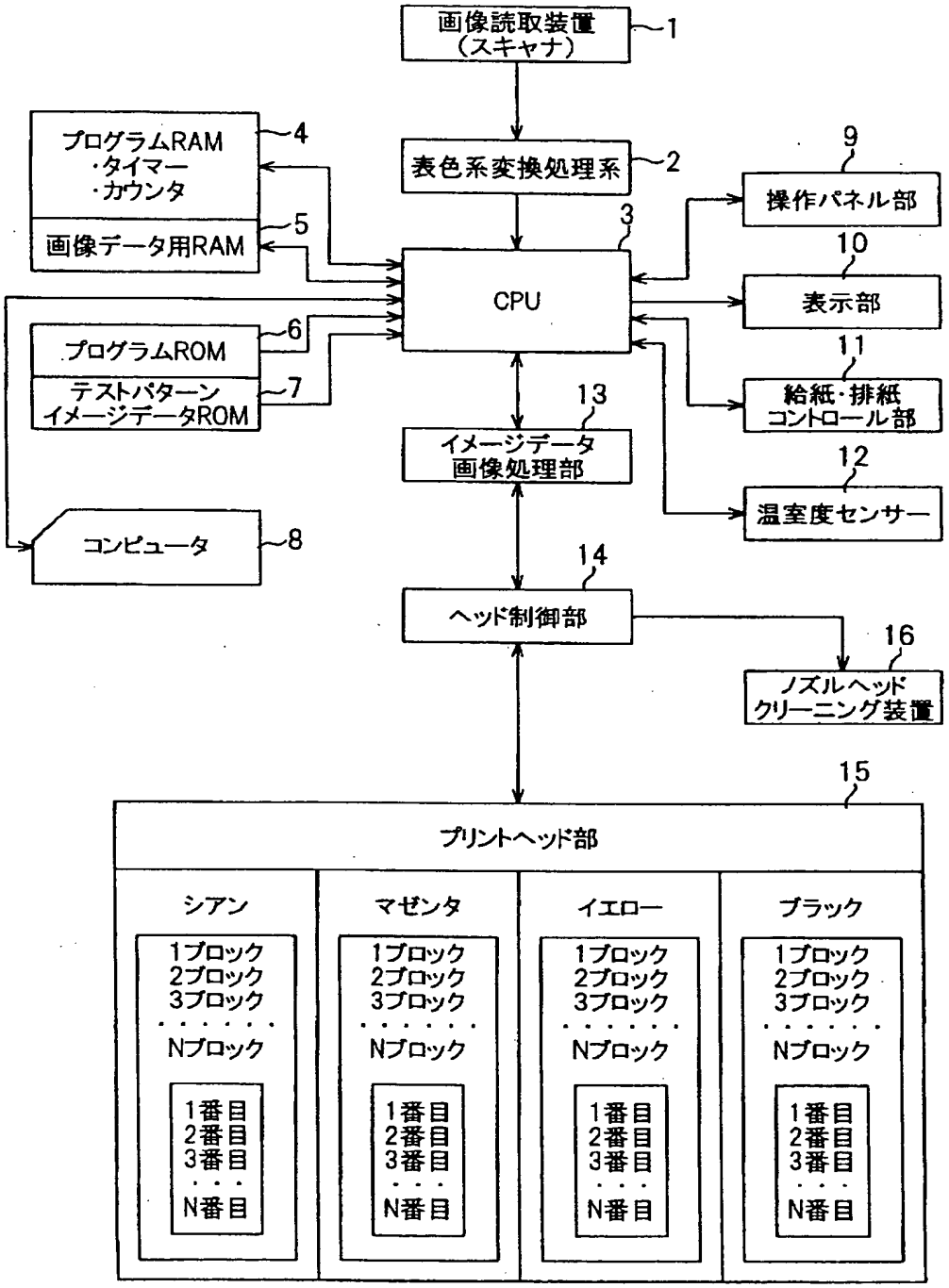
【図２５】



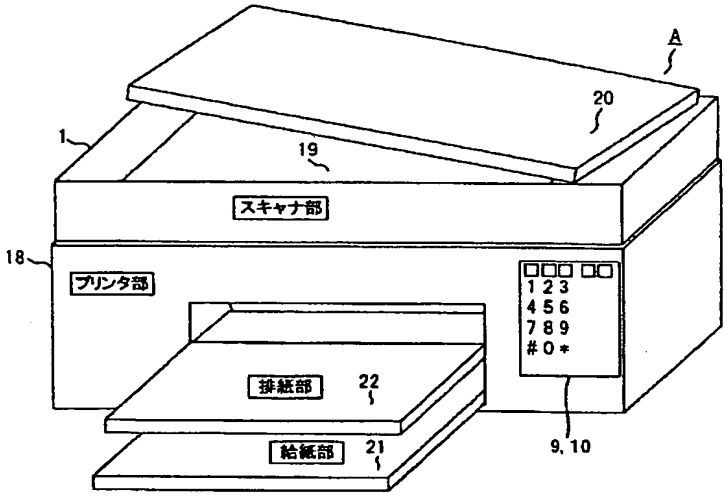
【図２６】



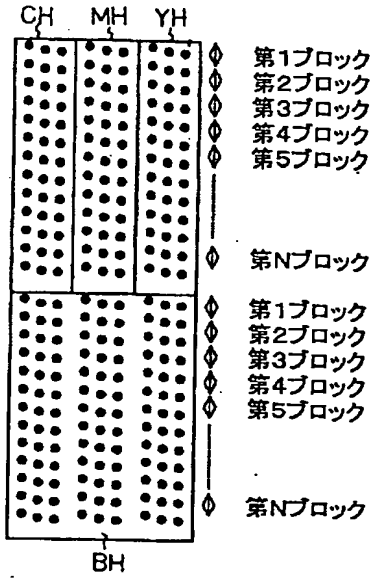
【図１】


画像読取装置
（スキャナ）
1
プログラムRAM
・タイマー
・カウンタ
4
画像データ用RAM
5
表色系変換処理系
2
9
操作パネル部
3
CPU
10
表示部
プログラムROM
6
テストパターン
イメージデータROM
7
11
給紙・排紙
コントロール部
13
イメージデータ
画像処理部
12
温室度センサー
コンピュータ
8
14
ヘッド制御部
16
ノズルヘッド
クリーニング装置
15
プリントヘッド部
シアン
マゼンタ
イエロー
ブラック
1ブロック
2ブロック
3ブロック
Nブロック
1番目
2番目
3番目
N番目

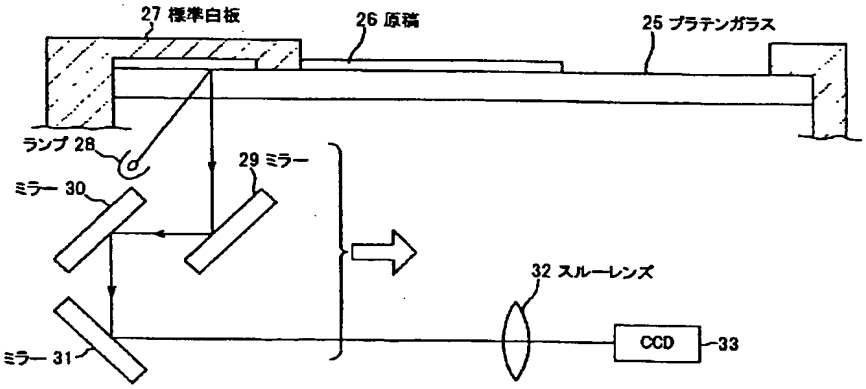
【図２】


A
20
1
19
スキャナ部
18
プリンタ部
1 2 3
4 5 6
7 8 9
0 *
排紙部
22
給紙部
21
9, 10

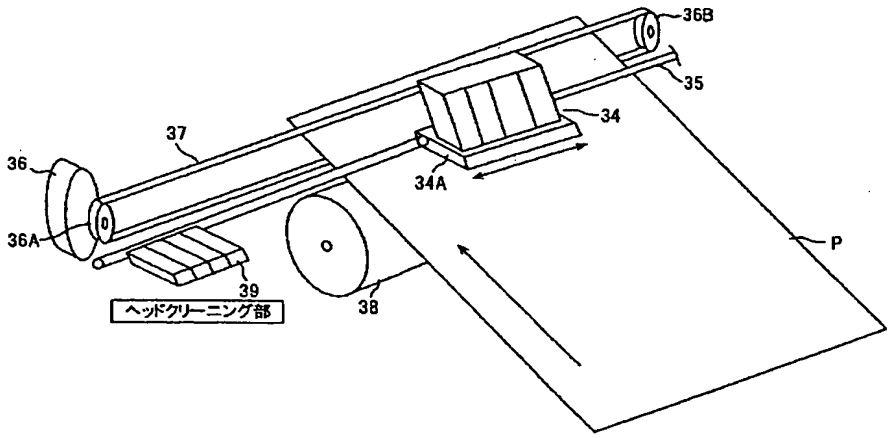
【図６】


CH
MH
YH
第1ブロック
第2ブロック
第3ブロック
第4ブロック
第5ブロック
第Nブロック
第1ブロック
第2ブロック
第3ブロック
第4ブロック
第5ブロック
第Nブロック
BH

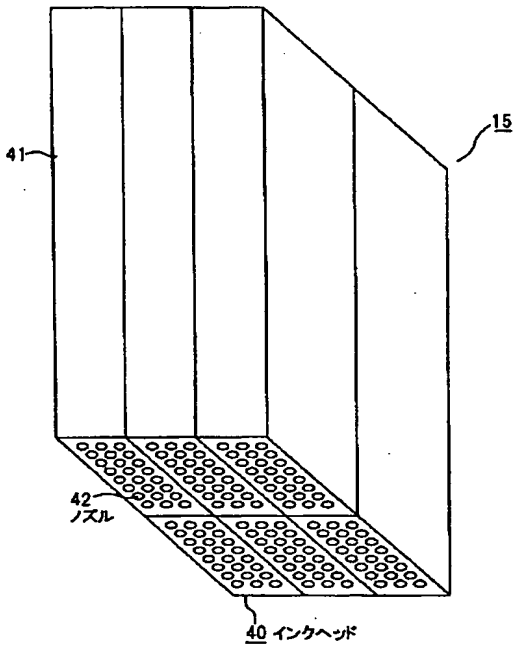
【図３】


27 標準白板
26 原稿
25 プラテンガラス
ランプ 28
29 ミラー
ミラー 30
32 スルーレンズ
CCD
33
ミラー 31

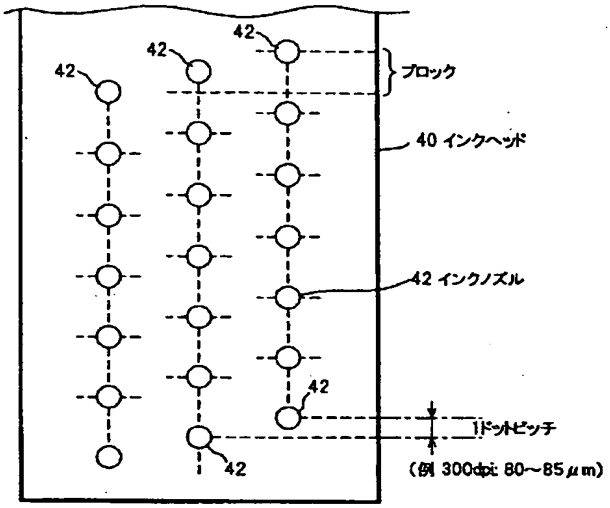
【図４】


36B
35
34
37
36
34A
36A
P
39
ヘッドクリーニング部
38

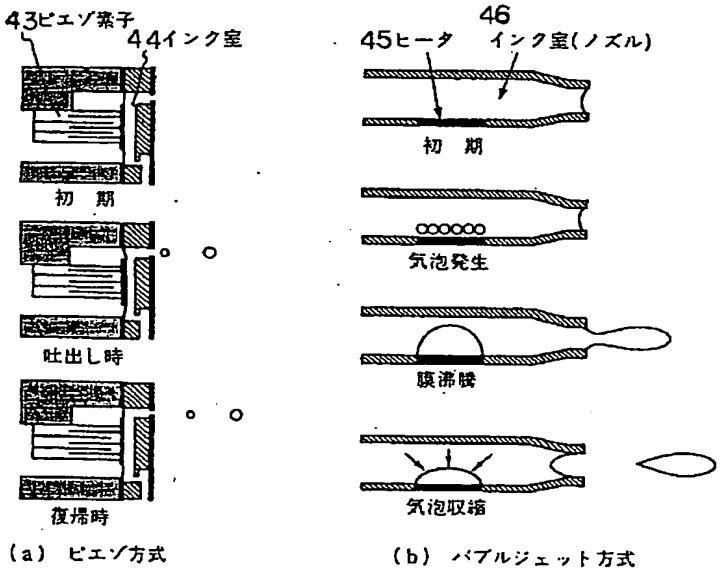
【図５】



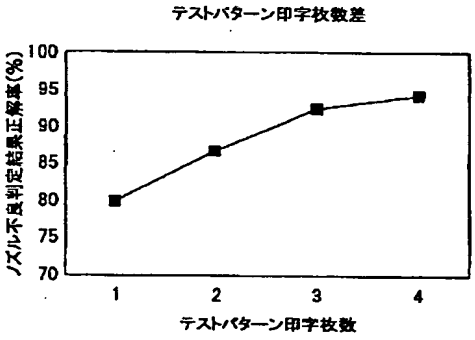
【図７】



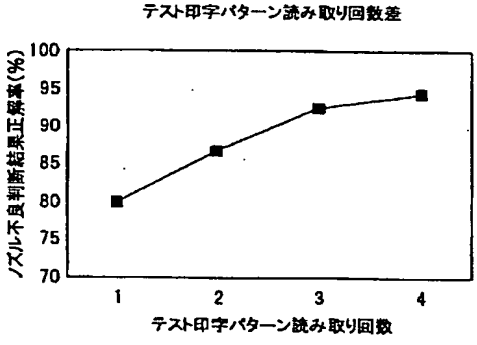
【図８】



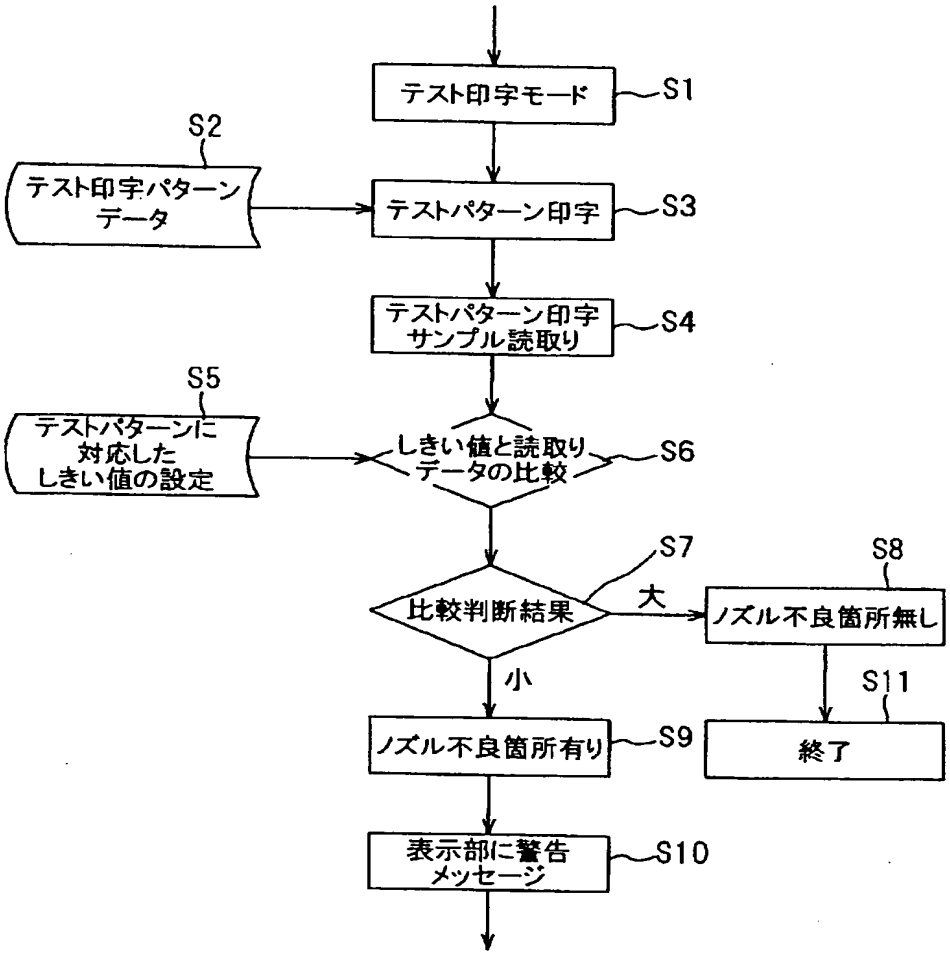
【図１３】



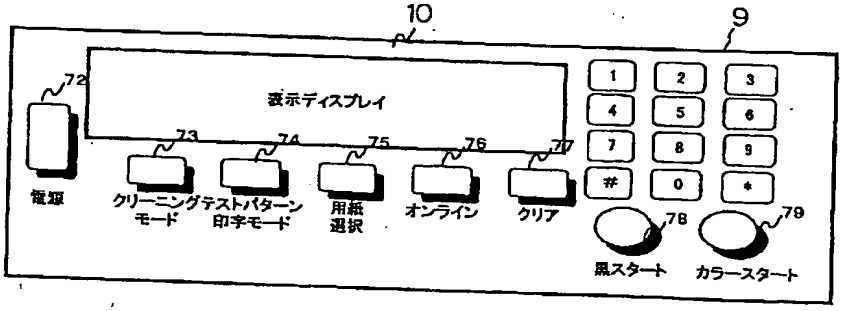
【図１４】



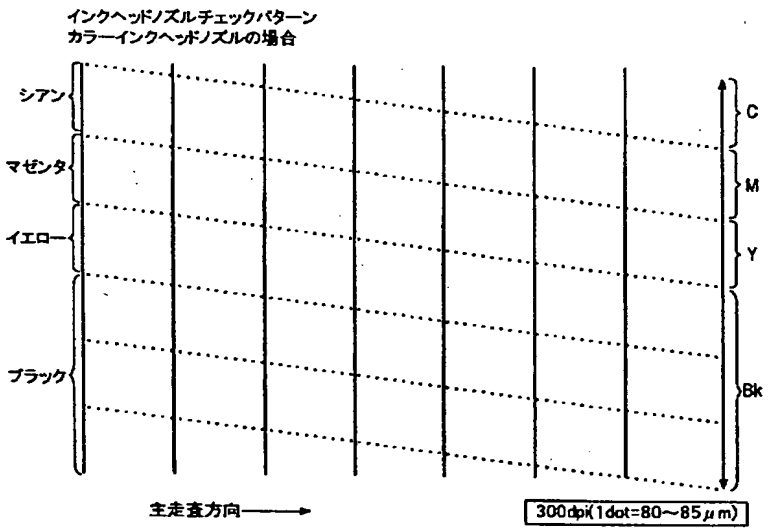
【図９】


テスト印字モード
S1
S2
テスト印字パターンデータ
テストパターン印字
S3
テストパターン印字サンプル読取り
S4
S5
テストパターンに対応したしきい値の設定
しきい値と読取りデータの比較
S6
S7
S8
比較判断結果
大
ノズル不良箇所無し
小
S11
ノズル不良箇所有り
S9
終了
表示部に警告メッセージ
S10

【図１２】


10
9
72
表示ディスプレイ
73
74
75
76
77
電源
クリーニングモード
テストパターン印字モード
用紙選択
オンライン
クリア
1
2
3
4
5
6
7
8
9
#
0
*
78
79
黒スタート
カラースタート

【図１０】



Cyan, Mazenta, Yellow, Black,それぞれ主走査方向に1画素分移動する毎にノズル列の1番目から1dotずつ順番に印字されていく。

【図１６】

2個の印字データの場合

(a) メモリーしてあるイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
マゼンタ	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
イエロー	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
ブロックNo.	1			2			3			4			32			33		

(b) テスト印字サンプルを読み取ったイメージデータ

IB

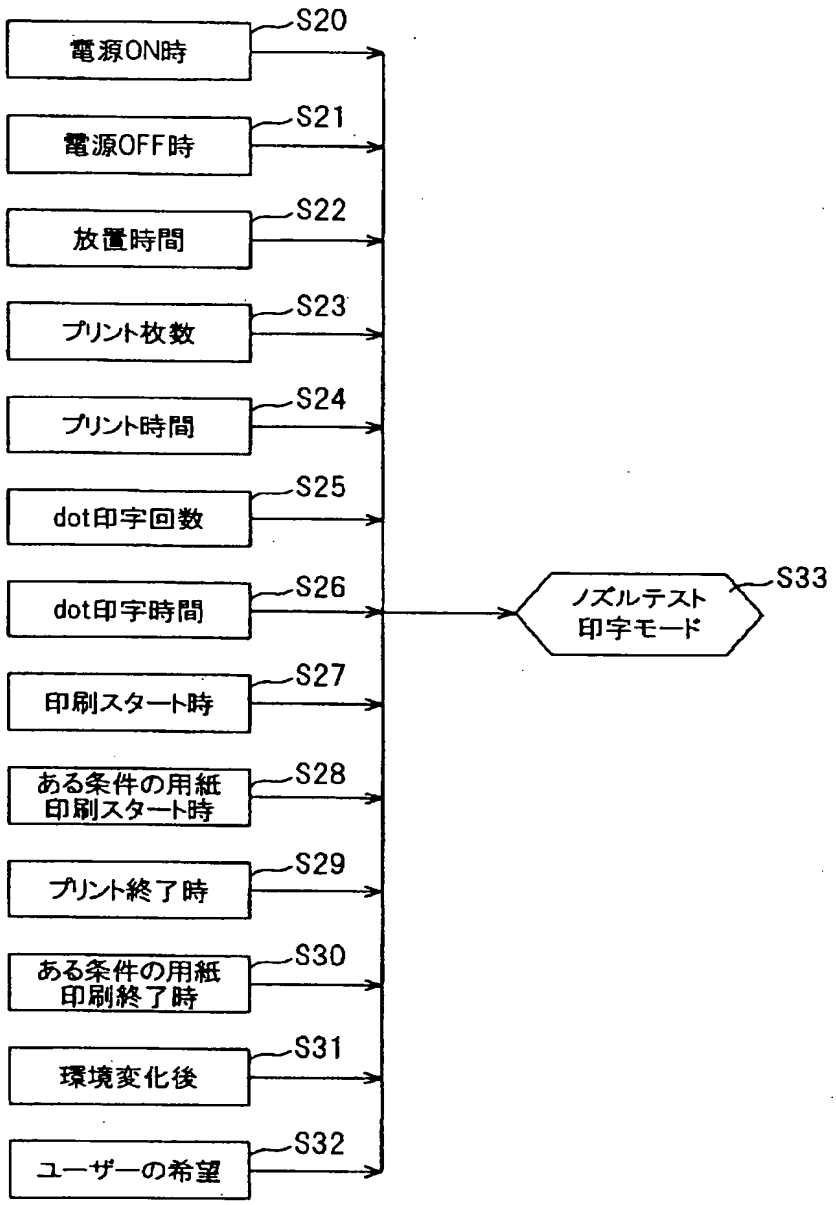
ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	238	226	238	222	251	244	251	234	241	235	234		244	251	217	241	242	237
マゼンタ	237	241	238	239	239	238	252	219	21	228	231		248	247	250	235	10	239
イエロー	250	16	27	255	237	230	245	220	222	231	247		238	226	247	233	233	248
ブロックNo.	1			2			3			4			32			33		

(c) ある一定の値より大きいか、小さいか判断結果

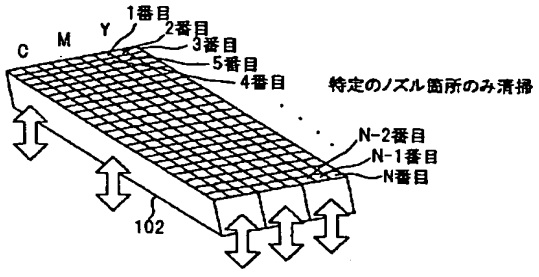
IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	大	大	大	大	大	大	大	大	大	大	大		大	大	大	大	大	大
マゼンタ	大	大	大	大	大	大	大	大	小	大	大		大	大	大	大	小	大
イエロー	大	小	小	大	大	大	大	大	大	大	大		大	大	大	大	大	大
ブロックNo.	1			2			3			4			32			33		

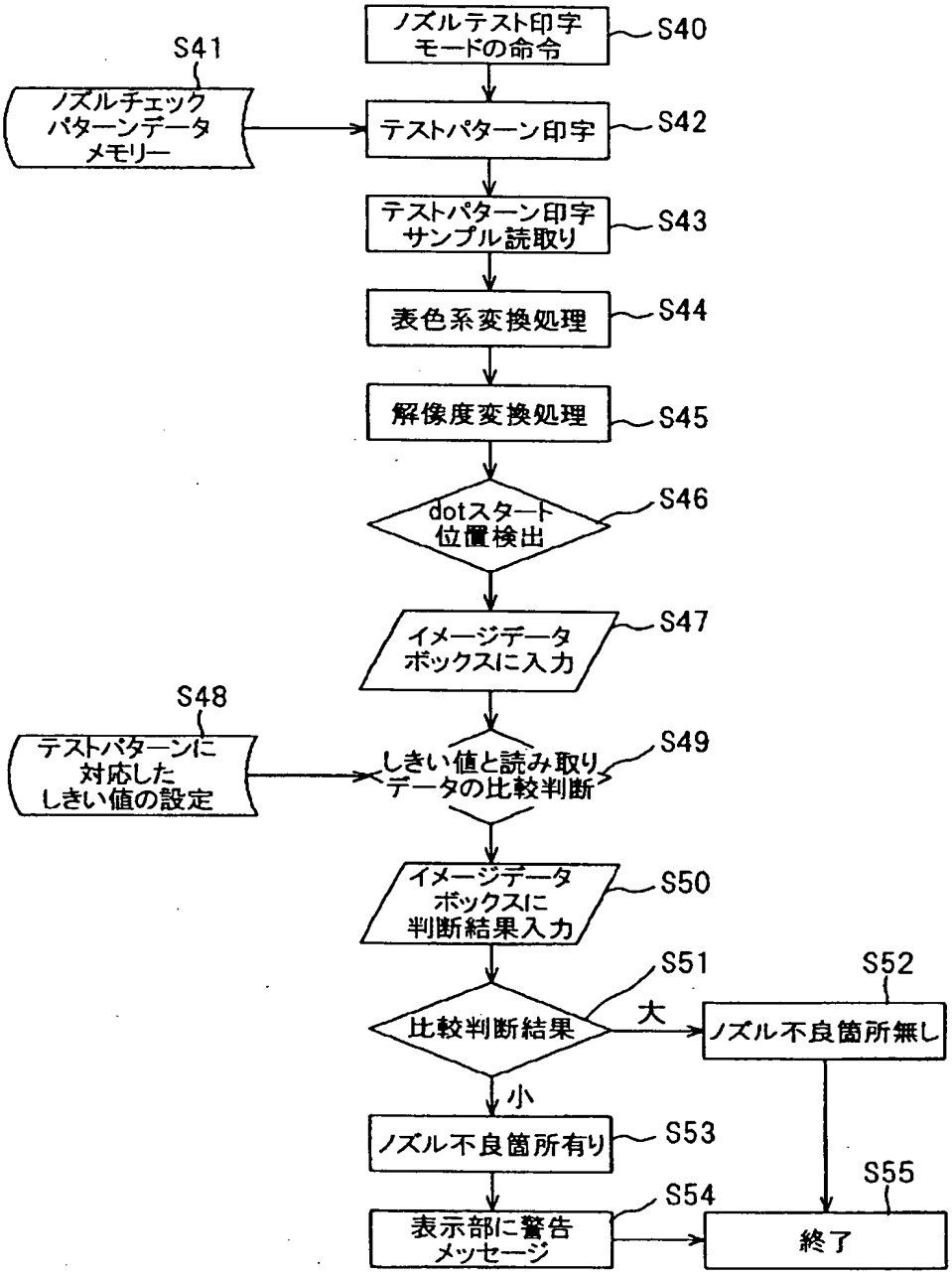
【図１１】


電源ON時
S20
電源OFF時
S21
放置時間
S22
プリント枚数
S23
プリント時間
S24
dot印字回数
S25
dot印字時間
S26
印刷スタート時
S27
ある条件の用紙
印刷スタート時
S28
プリント終了時
S29
ある条件の用紙
印刷終了時
S30
環境変化後
S31
ユーザーの希望
S32
ノズルテスト
印字モード
S33

【図２７】


C
M
Y
1番目
2番目
3番目
5番目
4番目
特定のノズル箇所のみ清掃
N-2番目
N-1番目
N番目
102

【図１５】


ノズルテスト印字
モードの命令
S40
S41
ノズルチェック
パターンデータ
メモリー
テストパターン印字
S42
テストパターン印字
サンプル読取り
S43
表色系変換処理
S44
解像度変換処理
S45
dotスタート
位置検出
S46
イメージデータ
ボックスに入力
S47
S48
テストパターンに
対応した
しきい値の設定
しきい値と読み取り
データの比較判断
S49
イメージデータ
ボックスに
判断結果入力
S50
S51
S52
比較判断結果
大
ノズル不良箇所無し
小
ノズル不良箇所有り
S53
S55
S54
表示部に警告
メッセージ
終了

【図１７】

多値の印字データの場合（印字５階調：読み取り８ｂｉｔの場合）

（ａ）メモリーしてあるイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
マゼンタ	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
イエロー	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
ブロックNo.	1			2			3			4			32			33		

（ｂ）テスト印字サンプルを読み取ったイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	238	226	233	222	251	244	251	234	241	235	234		244	251	217	241	242	237
マゼンタ	237	241	238	239	239	238	252	219	200	228	231		248	247	250	235	201	239
イエロー	250	210	209	255	237	230	245	220	222	231	247		238	226	247	233	233	248
ブロックNo.	1			2			3			4			32			33		

（ｃ）あるしきい値を２１４に設定して、そのしきい値以上の時か、しきい値以下か判断結果

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	大	大	大	大	大	大	大	大	大	大	大		大	大	大	大	大	大
マゼンタ	大	大	大	大	大	大	大	大	小	大	大		大	大	大	大	小	大
イエロー	大	小	小	大	大	大	大	大	大	大	大		大	大	大	大	大	大
ブロックNo.	1			2			3			4			32			33		

【図１８】

（ａ）メモリーしてあるイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	192	192	192	192	192	192	192	192	192	192	192		192	192	192	192	192	192
マゼンタ	192	192	192	192	192	192	192	192	192	192	192		192	192	192	192	192	192
イエロー	192	192	192	192	192	192	192	192	192	192	192		192	192	192	192	192	192
ブロックNo.	1			2			3			4			32			33		

（ｂ）テスト印字サンプルを読み取ったイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	190	166	180	177	163	177	189	162	164	187	163		188	172	169	153	170	162
マゼンタ	183	172	182	169	186	163	190	172	139	166	177		183	190	166	160	149	174
イエロー	160	120	133	188	189	171	177	188	185	156	182		178	164	157	181	165	188
ブロックNo.	1			2			3			4			32			33		

（ｃ）あるしきい値を１５０に設定して、そのしきい値以上の時か、しきい値以下か判断結果

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	大	大	大	大	大	大	大	大	大	大	大		大	大	大	大	大	大
マゼンタ	大	大	大	大	大	大	大	大	小	大	大		大	大	大	大	小	大
イエロー	大	小	小	大	大	大	大	大	大	大	大		大	大	大	大	大	大
ブロックNo.	1			2			3			4			32			33		

【図１９】

(a) メモリーしてあるイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	128	128	128	128	128	128	128	128	128	128	128		128	128	128	128	128	128
マゼンタ	128	128	128	128	128	128	128	128	128	128	128		128	128	128	128	128	128
イエロー	128	128	128	128	128	128	128	128	128	128	128		128	128	128	128	128	128
ブロックNo.	1			2			3			4			32			33		

(b) テスト印字サンプルを読み取ったイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	120	117	122	100	119	111	113	103	102	115	112		103	99	111	102	102	110
マゼンタ	118	110	113	117	104	129	114	105	82	100	121		120	102	104	114	83	115
イエロー	122	95	93	103	97	117	119	109	121	111	106		115	109	115	111	109	119
ブロックNo.	1			2			3			4			32			33		

(c) あるしきい値を９６に設定して、そのしきい値以上の時か、しきい値以下か判断結果

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	大	大	大	大	大	大	大	大	大	大	大		大	大	大	大	大	大
マゼンタ	大	大	大	大	大	大	大	大	小	大	大		大	大	大	大	小	大
イエロー	大	小	小	大	大	大	大	大	大	大	大		大	大	大	大	大	大
ブロックNo.	1			2			3			4			32			33		

【図２０】

(a) メモリーしてあるイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	64	64	64	64	64	64	64	64	64	64	64		64	64	64	64	64	64
マゼンタ	64	64	64	64	64	64	64	64	64	64	64		64	64	64	64	64	64
イエロー	64	64	64	64	64	64	64	64	64	64	64		64	64	64	64	64	64
ブロックNo.	1			2			3			4			32			33		

(b) テスト印字サンプルを読み取ったイメージデータ

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	55	48	40	39	58	37	39	38	47	43	57		40	33	58	59	44	52
マゼンタ	60	39	49	44	59	41	48	50	25	51	60		38	40	42	48	29	57
イエロー	50	29	29	41	63	49	49	51	38	61	47		40	49	55	53	40	60
ブロックNo.	1			2			3			4			32			33		

(c) あるしきい値を３２に設定して、そのしきい値以上の時か、しきい値以下か判断結果

IB

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	大	大	大	大	大	大	大	大	大	大	大		大	大	大	大	大	大
マゼンタ	大	大	大	大	大	大	大	大	小	大	大		大	大	大	大	小	大
イエロー	大	小	小	大	大	大	大	大	大	大	大		大	大	大	大	大	大
ブロックNo.	1			2			3			4			32			33		

【図２１】

フォトインクを使用しているヘッド印字データの場合（印字2値：読み取り８ｂｉｔの場合）

（ａ）メモリーしてあるイメージデータ

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
マゼンタ	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
イエロー	255	255	255	255	255	255	255	255	255	255	255		255	255	255	255	255	255
ブロックNo.	1			2			3			4			32			33		

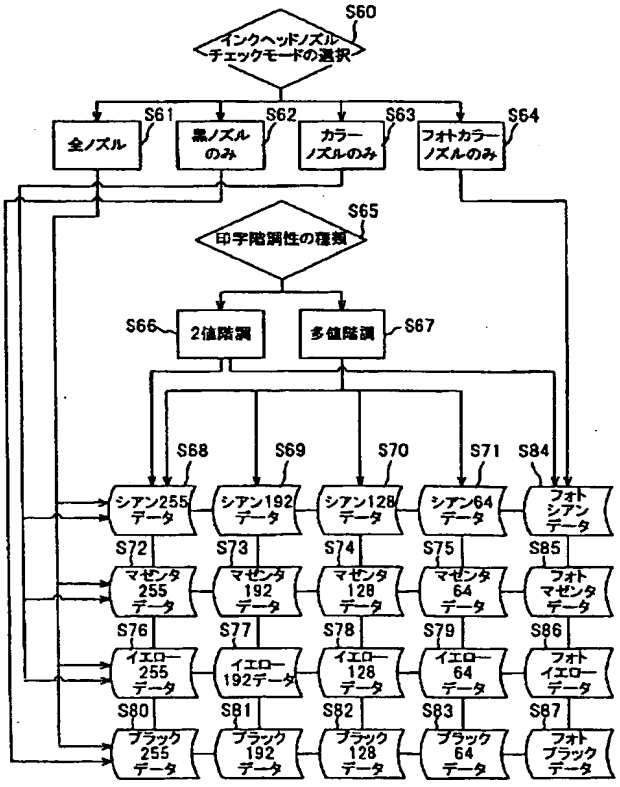
（ｂ）テスト印字サンプルを読み取ったイメージデータ

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	120	117	122	100	119	111	113	103	102	235	112		103	99	111	102	102	110
マゼンタ	118	110	113	117	104	129	114	105	82	100	121		120	102	104	114	80	115
イエロー	122	95	98	103	97	117	119	109	121	111	106		115	109	115	111	109	119
ブロックNo.	1			2			3			4			32			33		

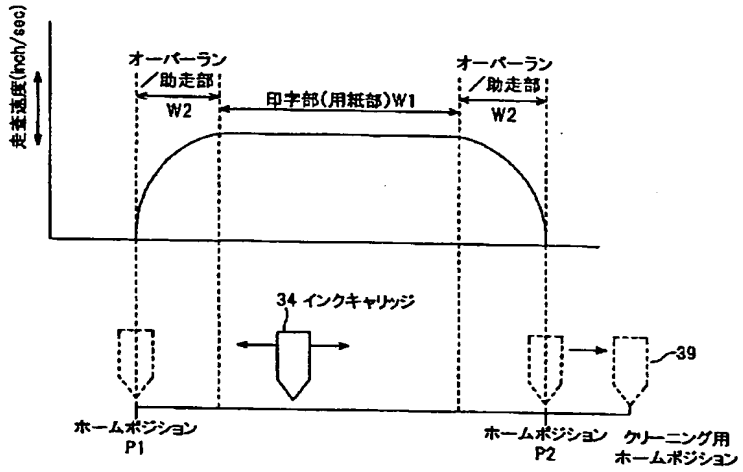
（ｃ）あるしきい値を９６に設定して、そのしきい値以上の時か、しきい値以下か判断結果

ノズルNo.	1	2	3	4	5	6	7	8	9	10	11		94	95	96	97	98	99
シアン	大	大	大	大	大	大	大	大	大	大	大		大	大	大	大	大	大
マゼンタ	大	大	大	大	大	大	大	大	小	大	大		大	大	大	大	小	大
イエロー	大	小	小	大	大	大	大	大	大	大	大		大	大	大	大	大	大
ブロックNo.	1			2			3			4			32			33		

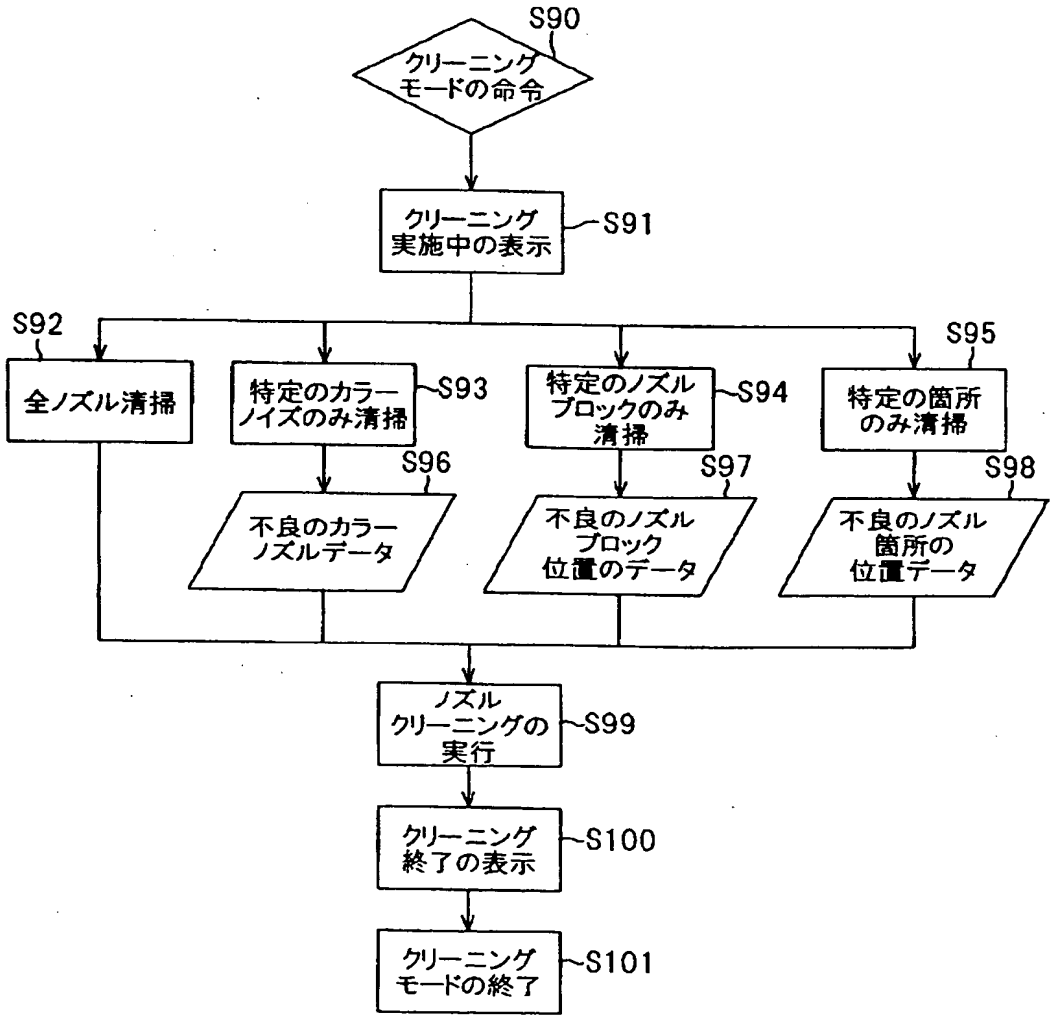
【図２２】



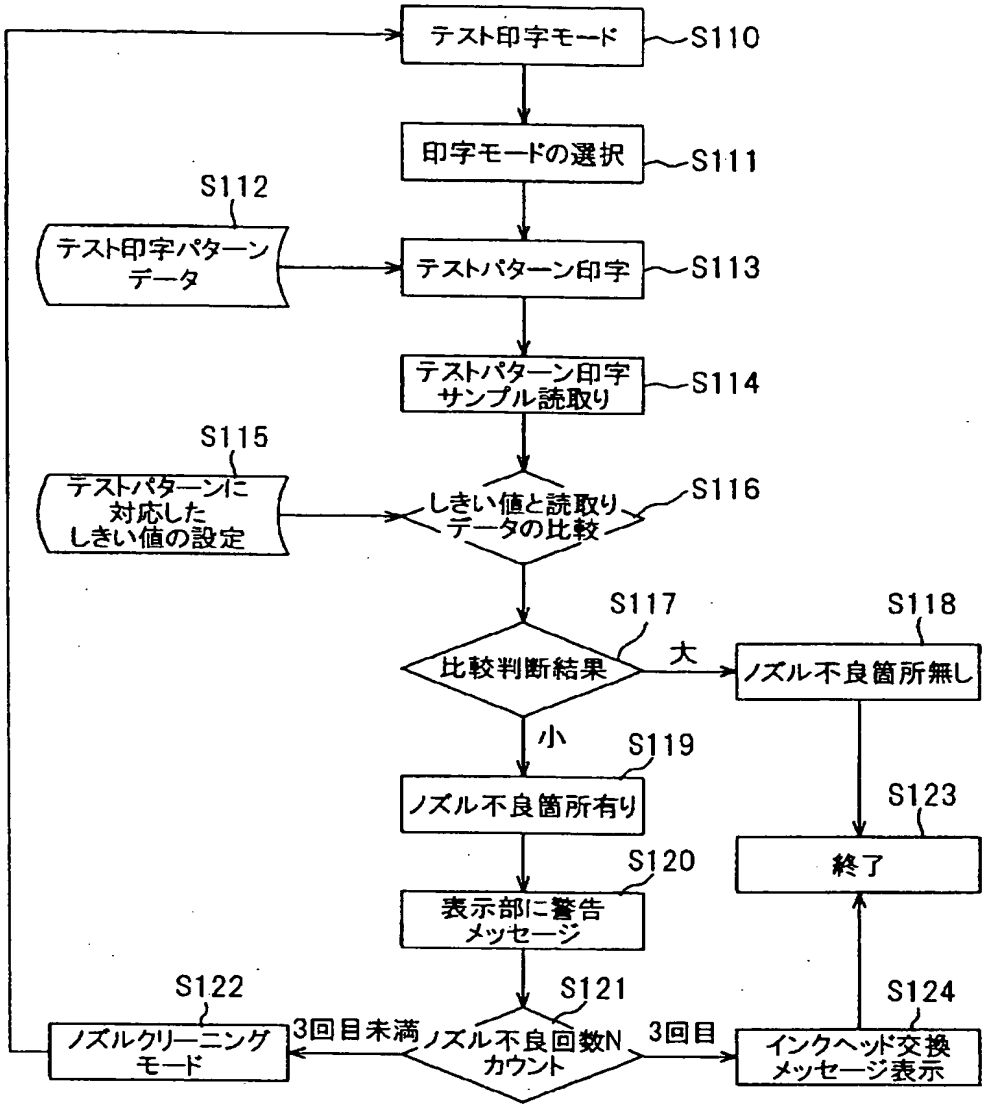
【図２３】


走査速度(inch/sec)
オーバーラン
助走部
W2
印字部(用紙部)W1
オーバーラン
助走部
W2
34 インクキャリッジ
39
ホームポジション
P1
ホームポジション
P2
クリーニング用
ホームポジション

【図２４】


S90
クリーニング
モードの命令
クリーニング
実施中の表示
S91
S92
全ノズル清掃
特定のカラー
ノイズのみ清掃
S93
特定のノズル
ブロックのみ
清掃
S94
S95
特定の箇所
のみ清掃
S96
不良のカラー
ノズルデータ
S97
不良のノズル
ブロック
位置のデータ
S98
不良のノズル
箇所の
位置データ
ノズル
クリーニングの
実行
S99
クリーニング
終了の表示
S100
クリーニング
モードの終了
S101

【図２８】



フロントページの続き

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2C061 AQ05 AR01 AS02 KK04 KK13 KK14 KK18 KK25 KK26 KK28 KK34 KK35